

96
1083

DEEPER WATERWAYS

FROM
PUBLIC ARCHIVES
OF CANADA

THE GREAT LAKES TO THE ATLANTIC

REPORTS

OF THE

CANADIAN MEMBERS

OF THE

INTERNATIONAL COMMISSION

PRINTED BY ORDER OF PARLIAMENT



OTTAWA

PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST
EXCELLENT MAJESTY

1897

[No. 16a—1898.]

PROBATION DEPARTMENT
ALABAMA TO

PROBATION DEPARTMENT
ALABAMA TO

The

Ass
at t
the

of v
forw
are

RES

the
usefu

comm
on a
and

sea l
impr
the l

State

REPORTS
OF
CANADIAN COMMISSIONERS
DEEP WATERWAYS COMMISSION.

TORONTO, 13th September, 1895.

The Honourable
The Secretary of State,
Ottawa.

DEAR SIR,—I have the honour, on behalf of the International Deep Waterways Association, to inclose you communications covering copies of the resolutions adopted at the Deep Waterways Convention held at Toronto in September, 1894, and forming the platform of the International Deep Waterways Association then founded.

It is my duty to respectfully request that you will kindly cause these resolutions, of which the fifth more particularly is of a broadly international character, to be forwarded through the proper channel to the various Governments to which they are addressed.

I have the honour to be, dear Sir,

Very respectfully yours,

O. A. HOWLAND,
President International Deep Waterways Association.

*RESOLUTIONS adopted by the International Deep Waterways Association, in Convention
at Toronto, 23rd September, 1894.*

Whereas, This convention has assembled for the purpose of promoting the union of the lakes and the high seas by waterways of the greatest practicable capacity and usefulness; and, recognizing the supreme utility of such waterways development:

Resolved, That the depth of all channels through the lakes and their sea-board connections be not less than 21 feet, and that all permanent structures be designed on a basis of not less than 26 feet, in order that the greater depth may be quickly and cheaply obtained whenever demanded by the future necessities of commerce.

Resolved, That this convention recognizes the utility of the natural route to the sea by the St. Lawrence River as most quickly and cheaply improvable, and is also impressed with the commercial necessity of the route reaching the Atlantic Ocean via the Hudson River.

Resolved, That we recommend that the Governments of Canada and the United States appoint a joint commission to consider and report fully upon the advisability

of the two countries uniting to establish deep ship channels from the great lakes to the sea, free and neutral, at joint expense, under joint control, as well as the probable character and expense thereof, together with the equitable share that should be charged to each country, and whether the two countries may not co-operate in said undertaking in all matters necessarily international in character.

Resolved, That we cordially approve all projects designed to extend marine commerce by means of waterways from the great lakes into new territory.

Resolved, That as a preparation for the joint promotion of common interests, it is desirable that a permanent court should be constituted for the decision by rules of law of all questions of an international character which may in any wise arise between the peoples and Governments of the British Empire and the United States.

Resolved, That these resolutions be respectfully communicated to the Governments and Parliaments of Great Britain and the Colonies of the British Empire and the Government of the United States.

Certified,

O. A. HOWLAND,

President.

FRANK E. FLOWER,

Secretary.

OTTAWA, 18th September, 1895.

SIR,—I have the honour to acknowledge the receipt of your letter of the 13th instant, transmitting copy of the Resolutions adopted at the Deep Waterways Convention held in Toronto in September, 1894, together with sealed communications twelve in number, said to cover copies of such Resolutions which you desire to have transmitted to the various Governments to which they are addressed.

These communications I observe are intended, one for the Right Honourable Joseph Chamberlain, Secretary of State for the Colonies, and the others for the Governments of various dependencies of the British Empire. So far as that addressed to Mr. Chamberlain is concerned, this Government is certainly the proper channel of transmission, but as regards the others there would appear to be no adequate reason why the Government should undertake to transmit them, or why they should not be forwarded to their respective destinations by the Association through the mails in the ordinary way.

I therefore return you the inclosures covered by your letter, with the exception of that intended for Mr. Chamberlain.

May I suggest that the use in the superscription upon the envelopes, of the word "province" as applied to the several Colonies to which the communications are addressed is evidently the result of a clerical error.

I have the honour to be, Sir,

Your obedient servant,

L. A. CATELLIER,

Under-Secretary of State.

O. A. HOWLAND, Esq., M.P.P.,
Toronto, Ont.

OTTAWA, 18th September, 1895.

SIR,—I have the honour to transmit, herewith, a sealed communication addressed to the Right Honourable Joseph Chamberlain, Secretary of State for the Colonies, and said to contain copy of the Resolutions adopted by the Deep Waterways Convention held at Toronto in September, 1894, which has been forwarded to this department by

Mr. O. A. Howland, President of the International Deep Waterways Association, in order that it may be transmitted to Mr. Chamberlain.

I am to request that His Excellency may be moved to forward the said communication to its destination.

I have the honour to be, Sir,

Your obedient servant,

L. A. CATELLIER,

Under-Secretary of State.

The Governor General's Secretary,
Ottawa.

(Copy No. 99713.)

DEPARTMENT OF RAILWAYS AND CANALS,

OTTAWA, 14th December, 1895.

SIR,—I have to inform you that by an Order in Council dated the 30th ultimo, you have, in conjunction with Messrs. T. C. Keefer and Thos. Monro, been appointed a Commissioner on behalf of the Government of the Dominion of Canada to meet and confer with the Commissioners appointed by the President of the United States with regard to feasibility of constructing such canals as will enable vessels engaged in ocean commerce to pass to and fro between the great lakes and the Atlantic Ocean.

The points on which you are to make inquiry and report are fully set forth in the Order in Council above referred to (a copy of which is inclosed herewith), and I am to state that you will accept the Order in Council as your instructions in this matter.

I am, Sir,

Your obedient servant,

JNO. H. BALDERSON,

Secretary.

O. A. HOWLAND, Esq., M.P.P.,
Toronto.

(Similar letters to Messrs. T. C. Keefer and Thos. Monro.)

EXTRACT from a Report of the Committee of the Honourable the Privy Council, approved by His Excellency on the 30th November, 1895.

On a Report, dated 22nd November, 1895, from the Minister of Railways and Canals, submitting that by petition to Your Excellency in Council, the President and members of the International Deep Waterways Association have set forth that the Congress of the United States has enacted as follows :—

“The President of the United States is authorized to appoint, immediately after the passage of this Act, three persons who shall have power to meet and confer with any similar committee which may be appointed by the Government of Great Britain or of

the Dominion of Canada, and who shall make inquiry and report whether it is feasible to build such canals as shall enable vessels engaged in ocean commerce to pass to and fro between the great lakes and the Atlantic Ocean, with an adequate and controllable supply of water for continual use; where such canals can be most conveniently located, the probable cost of the same, with estimate in detail; and if any part of the same should be built in the territory of Canada, what regulations or treaty arrangements will be necessary between the United States and Great Britain to preserve the free use of such canal to the people of this country at all times; and all necessary facts and considerations relating to the construction and future use of deep water channels between the great lakes and the Atlantic Ocean. The persons so appointed shall serve without compensation in any form, but they shall be paid their actual travelling and other necessary expenses, not exceeding in all ten thousand dollars, for which purpose the said sum of ten thousand dollars, or so much thereof as may be necessary, is hereby appropriated."

The Minister represents that, by a letter addressed, on the 9th instant, to the Honourable the First Minister, by Mr. O. A. Howland, the International President of the said Association, it was intimated that the President had appointed, in accordance with the aforesaid enactment, three gentlemen as Commissioners for the purposes of this inquiry, and it was asked that Your Excellency's Government make similar appointments.

The Minister, considering that the question is one of sufficient importance to justify expenditure in the direction of inquiry indicated by the said Act of Congress, recommends that the undermentioned gentlemen be appointed to carry on such inquiry on the lines specified in the said Act; and that they do meet and confer with the committee appointed by the President of the United States, and report to Your Excellency in Council as to the results of their investigation; namely:—

O. A. Howland, Esq., M.P.P.,

International President Waterways Association.

T. C. Keefer, Esq., C.E., C.M.G.

T. Monro, Esq., M. Inst. C.E.,

President, Canadian Society Civil Engineers.

The Minister further recommends that it shall be understood that these gentlemen will serve without compensation, but that their actual travelling and other necessary expenses will be defrayed by the Government, for which purpose he (the Minister) recommends that a special item be placed in the estimates to be laid before Parliament in the coming session.

The Committee submit the foregoing recommendations for Your Excellency's approval.

H. G. LAMOTHE,

For the Clerk of the Privy Council.

OTTAWA, 26th March, 1896.

To the Hon. Sir CHARLES TUPPER, Bart.,
The Secretary of State,
Ottawa.

SIR,—The Canadian members of the International Commission have agreed upon a preliminary report of progress, which I have the honour to inclose.

Your Commissioners beg to apply, at the same time, for a further sum, in addition to the five hundred dollars hitherto advanced on account of the expenses of the Commissioners. The sum of \$500 has been exhausted, and expenses incurred to the amount of about two hundred and fifty dollars (\$250) in excess.

DEEP WATERWAYS COMMISSION.

The adjourned meeting of the International Commission has been arranged to take place during the coming month of April. As the meeting will be an important one, for the purpose of agreeing, if possible, upon an identical interim report to be laid before both Governments, and a large amount of material has been in preparation by the engineer members of both Commissions, the meeting may be expected to occupy a good many days and involve considerable expense on account of the Commissioners, and also for clerical expenses, &c.; we would, therefore, respectfully ask that a sum of one thousand dollars (\$1,000) should be placed at our disposal to cover expenses incurred.

I am requested, at the same time, on behalf of the Commission, to ask you to consider the propriety of embodying in an Order in Council the definition of the basis upon which the accounts of expenses of the Commissioners are to be rendered, viz., a *per diem* allowance of \$10 per day to each Commissioner, when absent from his place of residence, in addition to actual transportation expenses, and expenses for clerical assistance and rooms, when required for holding meetings, postage, &c.

I may state that the only account of expenses which has been kept hitherto has been upon this understanding, and that it would involve the Commissioners in a great deal of trouble and annoyance to keep and make up accounts of details of living and minor expenses upon any other basis. I may add that the personal experience of the Commissioners to this date has been that they have found themselves out of pocket fully to the extent represented by the above basis.

I have the honour to be, Sir,

Your obedient servant,

O. A. HOWLAND,

Chairman,

Canadian Commission on Deep Water Navigation.

PRELIMINARY REPORT.

MONTREAL, 15th March, 1896.

The Honourable

The Secretary of State,
Ottawa.

SIR,—The undersigned, appointed by Order in Council of 30th November last, as members of the International Commission on deep water navigation from the Great Lakes to the Ocean, have the honour to submit for your information the following preliminary report of progress.

Upon receipt of our instructions, by letter of 14th December, 1895, inclosing the Order in Council, your Commissioners held a meeting for organization at Ottawa, on the 29th December, 1895. Mr. Howland was elected Chairman, and Mr. Monro undertook for the present the charge of the records and memoranda of the Commission.

After a preliminary investigation of the materials in the possession of the Department of Railways and Canals, kindly placed at our disposal by the Honourable the Minister, your Commissioners notified their appointment to the members of the International Commission named by the President of the United States pursuant to the Act of Congress authorizing the creation of such Commission.

An invitation was received from Dr. Angell, Chairman of the United States Commissioners, to meet them at Detroit, which was accepted, and a joint sitting of the two Commissions was held there on the 17th, 18th, 20th, and 21st January.

The United States Commissioners held their first meeting on the 13th of January, and a meeting of the Lake Carriers' Association then being held at Detroit, advantage was taken of this by them to obtain a large quantity of very useful evidence from many of those gentlemen on the subject of the statistics of lake commerce and the conditions of navigation and transport as they exist, and as they would likely be affected by an improved deep waterway outlet for the largest vessels to the ocean. A copy of this evidence was placed at your Commissioners' disposal, and will form the subject of future reference.

The principal business of the joint sittings was the consideration of the existing materials in the form of maps, charts, surveys, and reports, hitherto made at various times by the Government of Great Britain, Canada, and the United States. It was found that information already existed which was sufficient to enable a provisional profile to be made of a route from Lake Superior to tide-water via the St. Lawrence and the Hudson, and such a profile was submitted by the very able and energetic engineer member of the United States Commission, Mr. Lyman E. Cooley, C.E.

It was found, however, that the information thus existing was insufficient to enable either branch of the Commission to report as required by the terms of the Act of Congress referred to in the Order in Council, as for instance, "Whether such canals as could enable vessels engaged in ocean commerce to pass to and fro between the Great Lakes and the Atlantic Ocean, can be constructed with provision for an adequate and controllable supply of water for continual use, also where such canals could be most conveniently located, and the probable cost of the same, with estimates in detail."

To report upon the first of these branches, requires an investigation of the conditions of the water levels of the Great Lakes, and an engineering inspection of the channels of the Rivers St. Mary, Detroit, Niagara, and St. Lawrence, with a view to ascertaining the practicability and nature of works required to maintain and control the water levels, and for this purpose legislation providing for an appropriation has been introduced at Washington.

To report upon the second subject, namely, the most convenient location for enlarged canals upon an international route, requires examination of the territory on the United States side of the Niagara and St. Lawrence Rivers, and also a revision of the surveys made of the link between Lake St. Francis and Lake Champlain, by way of the Richelieu River, and further information on that part of the route connecting Lake Champlain with the Hudson River. It was accordingly arranged that the International Commission should be adjourned until a date in the month of April, by which time the engineer members of the two Commissions hoped to be able to procure such further particulars on these subjects as would enable a preliminary report to be prepared, embodying such information on the foregoing particulars as is procurable with the means at present at the disposal of the two Commissions, and chiefly to indicate the nature and cost of the more extended investigation required to enable the International Commission to fulfil the object of its appointment.

It was agreed that each Commission should collect and collate all the information obtainable in their respective countries, and conduct as far as the means at their disposal allowed the necessary inquiries, to complete such information.

The object of fixing the date of the adjourned meeting for April next was in the hope and with the expectation that the report of the respective Commissions might be agreed upon in joint session and laid before the United States Congress and the Parliament of Canada during the present sessions of those bodies, so that the necessary appropriations might be made to enable the surveys to be proceeded with and completed during the coming summer.

We are glad to be able to report that by the steps taken by Mr. Monro in the interval since the adjournment of the International Commission, considerable progress has been made in that branch of the investigation for which by the foregoing understanding the Canadian Commission is responsible, namely, the general levels and alignment of a route between the St. Lawrence and Lake Champlain. It will be seen by Mr. Monro's report hereto appended, that a practicable alignment has been ascertained providing for the required deep water canal between Lake St. Francis and the

Richelieu River, and also the improvements required to complete a deep water channel through that river to Lake Champlain.

Mr. Monro's report will also enable the Government to form a judgment as to the amount of funds required to be provided for a more accurate survey and estimate of the cost of the Canadian portion of said works.

The St. Lawrence and Lake Champlain section, together with the necessary branch to connect it with Lake St. Louis and Montreal, will comprise the Canadian portion of a deep waterway, which will connect the Great Lakes with Montreal and New York; and it is probably due to a strong conviction in the West that the only way by which New York (the most important market on the continent) can be reached by the largest vessels without transshipment, is by utilizing the wide and deep waterways of Lake Ontario, the St. Lawrence River, and Lake Champlain, that this International Commission has been created, and also because such a waterway could be readily connected with ocean navigation at Montreal, and thus secure the shortest route to Europe.

While the Government of the United States have acceded to the urgent and combined desire of the people of the Western States and Lake Cities to undertake the investigation of the most feasible route to the Ocean, whether national or international in character, at the same time there are large local interests naturally favoured by national sympathies which advocate a route completely within United States territory. These influences have procured the introduction of an Act of Congress authorizing an appropriation of \$50,000 for an examination into the possibility of an entirely United States route by way of the Mohawk Valley from Lake Ontario to the Hudson.

It is submitted that means should be placed at the command of your Commission to enable an equally complete report, for comparative purposes, of the Canadian portion of an international route to be proceeded with with equal vigour.

All of which is respectfully submitted.

O. A. HOWLAND, *Chairman.*

THOS. C. KEEFER,

THOMAS MONRO.

SUPPLEMENT TO PRELIMINARY REPORT OF MARCH 10, 1896.

COTEAU LANDING, P. Q., 13th March, 1896.

SIR,—In accordance with an understanding arrived at between the Canadian members of the Deep Waterways Commission at their meeting in Ottawa on the 29th December last, I beg to forward, as a contribution to the engineering data required in considering the important question of route between the Great Lakes and the Atlantic sea-board, certain maps, profiles, &c., together with the following brief preliminary report on the subject.

I. LAKE ERIE TO LAKE ONTARIO.

The accompanying map (No. 1) was prepared, under my direction, for the London Exhibition of 1886. It shows the country lying to the west of the Niagara River and forming a part of the peninsula between the Lakes, through which the Welland Canal runs. Appended to this there is a profile showing the number and lifts of the locks between Port Dalhousie and Port Colborne.

Sheet No. 2 is a series of profiles, to uniform scales, of several lines projected for a ship canal between Lakes Erie and Ontario, together with the Welland Canal as constructed. These are compiled from various sources for purposes of comparison.

A glance at this document will indicate, to an experienced eye, the desirability of constructing that link of the deep waterway between the lakes in question on the eastern or United States side of the Niagara River.

The surveys and examinations made by Colonel Blunt in 1867, and revised by Captain Palfrey in 1889 serve to confirm this view. It is not considered necessary at present to refer to various conjectural locations on the Canadian side. In my opinion, however, satisfactory plans cannot be prepared for a channel of the contemplated dimensions to follow the summit level of the present Welland Canal. To attempt this the work would have to be largely done in winter at greatly increased cost, and its execution would interfere with the free working of the existing line of navigation and endanger its structures. It is therefore to be presumed that an enlargement necessarily involving such risks would not be sanctioned by the Government.

2. RIVER ST. LAWRENCE AND CANALS.

The series of canals between the Galops Rapids and Lake St. Francis are being built for a fourteen-foot navigation along the north shore of the river, and are now, as a whole, well advanced towards completion. From my knowledge of the location and construction of these canals it appears to be quite inadmissible to permit an attempt to be made to deepen them to twenty feet or more, for similar reasons to those above stated in reference to the Welland Canal.

A reconnaissance has been made, and a few levels taken on a line shown upon the accompanying trace (No. 3). This will serve to indicate (in connection with the soundings shown on the chart) that the United States, or south side of the St. Lawrence offers a fair site for a deep waterway from the head of the Galops to Lake St. Francis, opposite Cornwall.

3. LAKE ST. FRANCIS TO LAKE CHAMPLAIN.

As this part of the deep water channel must pass through Canadian territory should the St. Lawrence route be followed, I have endeavoured to collect as much information on the subject as the limited time and means at my disposal would permit.

The accompanying charts of Lake St. Francis show a generally wide and deep channel following its north shore to McKie's Point, a distance of about 22 miles from where the line 45° crosses the St. Lawrence. A comparatively small outlay would establish a channel of the required dimensions between these points. There are some shoal places near the upper end and middle of the lake, but for the most part the depths are from 25 to 50 feet with a mud bottom.

From McKie's Point the lake must be traversed to the proposed entrance of the St. Francis—Champlain Canal in Hungry Bay—about 8 miles, the total distance being about 30 miles. There will be heavy excavation at this approach, as the shore shoals up slowly. The character of the material is not known, but is conjectured to be boulders and clay. Rock may, however, be encountered above the level adopted for canal grade.

Plan No. 5 is on a scale of 4 miles to the inch. It was kindly given to me by the Director of the Geological Survey, and shows clearly the line which it is proposed to follow between Lake St. Francis and Lake Champlain. This runs in an easterly direction across the depressions or valleys of the St. Louis and Chateauguay rivers, and after skirting (about the 27th mile) the high ground near Ste. Philomène, bends almost due east and strikes for St. Johns on the Richelieu River—the total length of main canal being about 50 miles. I propose to locate the branch connecting with Lake St. Louis in a different position from that hitherto contemplated. It will leave the main line at the 17th mile, and run directly for the lake shore at a point about 1 mile west of Beauharnois Village. The length of this branch is only about 3½ miles, and the descent of 82½ feet could be made by three locks. The cuttings at the lower end would be largely in rock, which is wanted in connection with the structures and

lining of the canal. By following this plan the east-bound traffic would be thrown on to Lake St. Louis at its upper end and follow its wide and direct channel to Lachine. This would shorten the distance by canal, and the import trade would also be best suited by such location, together with that via the Ottawa, whilst the shoals and swift currents opposite Caughnawaga would be entirely avoided.

The profile (No. 8) will show that the route between Hungry Bay and St. Johns is, as a whole, very favourable. The numerous streams running north and crossing it have cut deep ruts into the clay, and there are but few indications of rock in the vicinity. But information has not yet been obtained sufficient to determine this point. It is, however, certain that the level of Lake St. Francis can be carried right through to the Richelieu, and the descent into that river made in the vicinity of St. Johns by two locks, each of about 29 feet lift. At the St. Francis end of the canal a guard lock will be built for obvious reasons, and intervening guard gates, will probably also be found necessary in the valley of the Chateauguay River.

Plan and profile No. 9 shows the Richelieu River between St. Johns and the International Boundary. It will be seen that to obtain a 25-foot channel at lowest water the excavation will be very heavy. The distance is about 23 miles, but the estimate will include the cost of extending the channel to deep water in Lake Champlain. This channel is shown to be 300 feet wide where straight, with a large increase of width at bends.

The main line will be crossed by a large number of bridges and cannot, therefore, be safely navigated at high speed. The prism area adopted is about 5,000 square feet, or say five times the cross section of the largest class of lake steamers. The question of resistance with reference to cross section in artificial channels is doubtless of much scientific interest; but the speed which can be judiciously made in canals is practically governed by other conditions. If the passage between Lakes St. Francis and Champlain (about 73 miles) is made in 15 hours it will be as fast as could reasonably be expected.

A vast deal of information must be collected, and a large amount of careful surveying done, before this important subject of a deep waterway can be authoritatively discussed. The present contribution to a knowledge of the matter is merely preliminary. But it will serve to indicate the direction in which further investigation should in my opinion, be proceeded with. Judging from previous experience I should say that from 15,000 to 20,000 dollars is at least required to make such surveys, plans, etc., as would enable the Canadian Commissioners to state definitely their views on the location and cost of that portion of the deep waterway which must pass for over one hundred miles through our territory should the St. Lawrence route be adopted. The branch to connect this with Lake St. Louis should be constructed so as to meet the wants of the increased trade to Montreal, which would doubtless follow the completion of such a magnificent line of navigation as that now contemplated.

4. LEVELS OF ST. LAWRENCE RIVER.

This question has an obvious and direct relation to the construction of any canal route along the river. All previous experience has shown that its fluctuations of surface are so great as to apparently preclude the possibility of arranging the navigation so as to have at all times the available depths intended.

During last winter (1894-5) levels were run under my direction between Kingston and Coteau Landing with a view of approximately determining the fall in the River St. Lawrence between these points.

The discovery was then made that there is but a slight declivity (about 0.30 feet) between Kingston and Prescott, instead of several feet as was heretofore believed and officially stated. In November, 1895, the water in Lake Ontario and the River St. Lawrence was lower than ever known before; lower even than in 1819, which was always supposed to represent the lowest stage. I have had a profile prepared (No. 10), which shows the fall at the various canals and river reaches from Kingston to Montreal. This document is unique: because it not only represents the river surface at its lowest known level, but the relative heights above mean sea level are shown with at least

approximate accuracy. This profile will at all events answer the purpose until the precision-levels of the Public Works Department shall have been extended as far west as Lake Ontario.

I subjoin a list of plans, profiles, &c., now handed in. These were mostly prepared by my principal assistant engineer, Mr. John L. Allison, Assoc. M. Inst. C.E., aided by other gentlemen on the staff, to all of whom I desire to express my thanks for the zeal they have shown in collecting a considerable amount of information in a very short space of time.

I have the honour to be, Sir,

Your obedient servant,

THOMAS MONRO, M. Inst. C.E.,
Canadian D. W. W. Commissioner.

O. A. HOWLAND, Esq., M.L.A., Ontario,
Chairman D.W.W. Commission (Canada),
Toronto, Ont.

LIST OF PLANS.

1. Map of part of Niagara Peninsula showing line of Welland Canal and profile of same.
2. Profiles of various routes Lake Erie to Ontario.
3. Trace of St. Lawrence chart. Galops to Cornwall.
4. } Chart of Lake St. Francis.
- 4a. }
5. Map (Geological Survey) showing proposed line of canal Lake St. Francis-Champlain with branch to Lake St. Louis.
6. Chart of Lake St. Louis.
7. Old trace map of country between Lake St. Louis and Champlain. Caughnawaga Canal, Lewis line, &c.
8. Profiles of proposed St. Francis-Champlain Canal and of branch to Lake St. Louis.
9. Plan and profile (combined) of Richelieu River.
10. Profile of St. Lawrence River at lowest known stage of the water (November, 1895) showing rise at canals, &c.
11. Plan of lock 525 x 60 x 24 and 26 ft. lift.

March 13, 1896.

THOMAS MONRO

NOTE.—No. 5 is the only one of the above plans published in connection with this report.

DEPARTMENT OF THE SECRETARY OF STATE.

OTTAWA, 30th March, 1896.

O. A. HOWLAND, Esq.,
Chairman,
Canadian Commission on Deep Water Navigation,
Department of Railways and Canals, Ottawa.

SIR,—I have the honour to acknowledge the receipt of your communication (with inclosures) of the 26th instant, setting forth that the Canadian members of the International Commission had agreed upon a preliminary report of progress, and asking, for the reasons therein set forth, that a sum of one thousand dollars (\$1,000) be placed at the disposal of the Commissioners, and to state that your said letter and the documents covered by it have been referred for the consideration of His Excellency the Governor General in Council.

I have, &c.,

JOSEPH POPE,
Acting Under-Secretary of State.

CANADIAN DEEP WATERWAYS COMMISSION.

SECOND INTERIM REPORT.

MONTREAL, 20th August, 1896.

SIR,—The Canadian members of the International Commission on Deep Water Navigation from the Great Lakes to the Ocean, have the honour to submit for your information the following as their second Interim Report of Progress of the work being carried on by them, pursuant to the instructions contained in Order in Council of 30th of November, 1895, and accompanying letter of instructions of December 14th, 1895.

It was stated in our first Interim Report of March 10th, 1896, that after organization, progress up to that date had consisted: In the first instance, in a preliminary investigation of the materials in the possession of the Department of Railways and Canals; followed by a meeting with the Commissioners appointed by the President of the United States with similar authority, held at Detroit on the 17th, 18th, 20th, and 21st of January, at which an understanding was come to between the two Commissions as to the collection and interchange of information.

The report further contained a general reference to information collated by the Canadian Commission pursuant to that understanding down to the date of the first Preliminary Report.

It was then stated that it was found that the information existing was insufficient to enable either branch of the Commission to report as required by the terms of their respective appointments, viz.: "Whether such canals as would enable vessels engaged in ocean commerce to pass to and fro between the Great Lakes and the Atlantic Ocean can be constructed, with provision for an adequate and controllable supply of water for continual use; also where such canals could be most conveniently located, and the probable cost of the same, with estimates in detail."

It was stated further that the report upon that division of the subject which relates to the most convenient location for enlarged canals upon an international route, required examination of the territory on the United States side of the Niagara and St. Lawrence rivers, new surveys between Lake St. Francis and Lake Champlain, by way of the Richelieu River, and on that part of the route connecting Lake Champlain with the Hudson River.

It was further stated that it was agreed that each Commission should collate all the information obtainable in their respective countries, and conduct, as far as the means at their disposal allowed, surveys and inquiries to complete such information.

Consequent upon this report, the sum of \$5,000 was placed in the Estimates and voted at the late Session of the Parliament of Canada.

Your Commissioners judged it to be the best policy to devote as much as possible of the limited fund at their disposal to a preliminary survey of the section between Lake St. Francis and the Richelieu River, because should the ultimate report of the United States branch of the Commission favour an international route for the improved system of navigation, this section of the route will become one of commanding necessity.

The prominent object of the producers in the Western States is to procure the completion of the most efficient route by which their products can be transported, without breaking bulk, from the Lake ports of the far West to the city of New York, the centre of their own local market upon the Eastern sea-board.

Another consideration which is second only in importance to them is the possession of an alternative outlet to tide-water in the St. Lawrence River, as an assurance of competition and increased transportation facilities, and as giving them by far the shortest route to Europe.

With regard to the feasibility of this international route, the preliminary examinations already made indicate that the natural features of the country, adjoining the Niagara and the St. Lawrence Rivers, will probably admit of the construction of the enlarged canals required, upon the United States side of those rivers, as far down as Lake St. Francis. From this point it is only through Canadian territory that such a route can reach tide-water, either on the St. Lawrence or the Hudson River. To demonstrate the feasibility of this necessarily international link of the route in an unanswerable manner appeared to be the first pressing duty before your Commissioners.

With the means at our disposal a satisfactory advance has been made in this direction. Particulars on the subject will be found in the special report of Mr. Monro appended. The work done and the results arrived at cannot be fully laid before you until the completion of accompanying plans and profiles now being lithographed.

The result will be found to be confirmatory of the view stated in our first Preliminary Report, viz., that a favourable location is available for a deep water canal between Lake St. Francis and the Richelieu River near St. Johns, on a scale adapted to the large craft which may be employed in the Upper Lakes, and which are really of sea-going dimensions. From St. Johns deepening will be required to a considerable extent to complete a suitable channel through that river to Lake Champlain.

A second meeting with the United States Commissioners, first appointed by them to take place in the month of April, was at length held at Niagara Falls on the 15th July, for the purpose of exchanging reports of progress. It was ascertained that the United States Commission had not completed to their satisfaction the whole of the work of which they had taken charge, including an investigation of routes from the Lakes to the sea-board upon United States territory. As appears by the schedule appended, these inquiries are of the most comprehensive character. They are being prosecuted in a remarkably able and vigorous manner, and promise very interesting and important results, for the information of both nations.

Your Commissioners have to record their indebtedness to the members of the United States Commission for a large mass of information in the form of plans, profiles, statistics and other data, courteously communicated by them, to exhibit the progress of their inquiries, although not at this stage available for formal publication. Cordial relations exist between the two Commissions, and the work has so far proceeded with the utmost harmony of aim and co-operation.

Arrangements have been made for holding an adjourned meeting of the two Commissions at Montreal early in September next. It is expected that both Commissions will then be in a position to present complete reports to their respective Governments upon the materials made available with the means hitherto respectively voted.

Information of a valuable and interesting character has been procured for the Commission, through the courtesy of Mr. Andrew Allan, President of the Allan Steamship

Company, from captains of its fleet as to navigation in the artificial channels, through Lake St. Peter, at different stages of the river and with different draughts of water; these reports having been requested for the purpose of determining the speed at which large and deeply-laden vessels may be able to navigate the deepened channels in the St. Mary's, St. Clair, and Detroit Rivers, as well as the Richelieu above St. Johns, and also any portions of the St. Lawrence above Lachine which may require deepening, through shoals, or in the approaches to the canals. These inquiries are being continued. Commercial tables of a special form have been kindly prepared by the Secretary of the Board of Trade, giving details of the commerce of Montreal as compared with competing seaports. The two Canadian Trunk Railways have also been applied to for information as to their transportation in connection with the Great Lakes. Interviews with merchants and transportation authorities have also been had with reference to the effect of deeper waterways from the Great Lakes, upon the commerce of the St. Lawrence.

Acknowledgment is due to the valuable assistance on many points cheerfully furnished to your Commissioners, and also at their request to the United States Commission, by the Chief Engineer of Railways and Canals, the Dominion Statistician, the Director of the Geological Survey of Canada, the Meteorological Office, Toronto, and the Crown Lands Department of the Provinces of Ontario and of Quebec.

Much remains to be done for estimate purposes on the route between the St. Lawrence and Lake Champlain, and also to ascertain the cost of carrying the deep water navigation on a similar scale from Lake St. Louis to the port of Montreal. For these purposes, your Commissioners desire respectfully to recommend that a further vote of the sum of Ten Thousand Dollars, as estimated by Mr. Monro in his report annexed, should be placed at the disposal of the Commission as soon as possible, so that the work can be vigorously continued during the open season of the present year.

All of which is respectfully submitted.

O. A. HOWLAND, *Chairman*.
THOS. C. KEEFER.
THOMAS MONRO.

To the Honourable the Secretary of State.

SCHEME OF INQUIRIES BY U. S. COMMISSION TO ACCOMPANY SECOND INTERIM REPORT OF 20TH AUGUST, 1896.

U. S. DEEP WATERWAYS COMMISSION,
CHICAGO, 30th June, 1896.

SCHEME OF INVESTIGATION.

Schedule "A."—Profiles of Maps and Water Routes.

The Lakes and Atlantic Waterway—

Chicago and Duluth-Superior to the sea-board through the Great Lakes and by the St. Lawrence River and by the Hudson River.

1. General Profile (with distance diagram).
General Route Map.
Notes of Explanation.
2. Lake Superior to Lake Huron.
3. Lake Michigan to Lake Huron.
4. Lake Huron to Lake Erie (with sketch and profile—St. Clair and Erie Ship Canal).
5. Lake Erie to Lake Ontario (with outline map).

6. Lake Ontario to Lake St. Francis through the St. Lawrence River (with outline map).
7. Lake St. Francis to Lake Champlain and to Montreal (with outline map).
8. St. Lawrence River from Montreal to deep water below Quebec.
9. The Champlain-Hudson Valley, from St. Johns, P.Q., to Troy Dam, N.Y.
10. Hudson River from Troy Dam to Atlantic Ocean.
11. Lake Ontario to Hudson River through the Oswego-Oneida-Mohawk Valley.
- 11a. Map (same) with profile, showing also Champlain-Hudson Valley.
12. Georgian Bay to Lake Ontario through Lake Simcoe (with outline map, half scale).
13. The Ottawa Route, from Georgian Bay to Richelieu River (half scale).
14. Early canal systems—

Erie and Champlain System	}	(one-fourth scale).
Rideau and Trent System		
15. Inter-Lake routes—

Superior and Green Bay Canal	}	(small scale).
Grand Saginaw Route		
Michigan and Erie Route		

Schedule "B."—Hydrographic Data.

1. Elevations for the Great Lakes and for the St. Lawrence and Hudson rivers.
2. Water levels for the Great Lakes and St. Lawrence Rivers (1860-1895)—

Tables—15 in number.
Diagrams—4 in number.
Notes—Manuscript.
3. Basin of the Great Lakes and of the St. Lawrence and Hudson Rivers (map and manuscript).
4. Effects of gales on Lake Erie—

Diagrams (3 in number).
Manuscript.
5. Water levels for the Great Lakes and St. Lawrence River (prior to 1860).
6. Rainfall and discharge. (Not taken up.)

Schedule "C."

1. Ice periods, lake and seaboard region. (Tables, map, diagrams and notes.)
2. Winter commerce (notes).
3. Steam carrying fleet, dimensions and draught.
4. Resistance of ships in restricted channels.
5. Canal prisms, locks, lifts and dams.
6. Excavation, new method therefor.

REPORT OF THOMAS MONRO, C.E., ON PROGRESS OF SURVEYS, TO
ACCOMPANY SECOND INTERIM REPORT.

COTEAU LANDING, 15th August, 1896.

SIR,—I beg to supplement the information contained in my Report dated 13th March, 1896, by the following brief statement of what has since been done in surveys for a line of navigation through that portion of Canadian territory which must form a link of the System of Deep Waterways, should an international route be adopted.

As you are aware, a resolution was passed at our Toronto meeting on the 16th May last, authorizing me to spend \$2,500 (out of the sum of \$5,000 voted by Parlia-

ment) in obtaining such additional information as could be collected for this small amount of money, and in the limited time available.

Accordingly, I organized a force of two parties of engineers and assistants, who were at once placed in the field, as the work contemplated had to be completed before the end of the fiscal year (30th June), at which time the unexpended portion of the appropriation would lapse.

A glance at the small map which accompanies this letter, will show that no practicable route for a canal can be had between the St. Lawrence River and Lake Champlain to the south of the International Boundary line of 45°, which runs from St. Regis at the head of Lake St. Francis to Rouse's Point, N.Y., a distance, approximately, of 65 miles.

A short study of the subject leads to the conclusion that to secure an unfailing supply of water for the contemplated navigation, it must be fed from the St. Lawrence; and to reduce the lockage to a minimum, the descent from the river to Lake Champlain should be continuous. A rapid examination of the country to be traversed shows that in order to fulfil these requirements in the best and most economical manner a line must be located, the profile of which shall be adapted as far as practicable to the plane assumed for the bottom line of the canal. For the present the surveys have been directed toward finding a suitable route for a channel between Lake St. Francis and the River Richelieu, the bottom width of which shall be 150 feet with 25 feet of water at the lowest known stage of the lake.

Accordingly a line was projected on the map, and surveying operations were begun about the 26th May. By the first week in July this line and the branch to Lake St. Louis were run out, measured, and levelled. The main line from Hungry Bay to St. Johns is 46½ miles long, and the branch is about three miles in length. These will serve as bases from which a proper location can be made. Although only preliminary, and susceptible of much improvement, they show conclusively that the physical features of the country traversed are very favourable for the construction of a great canal. But they as clearly demonstrate the fact that before any reliable idea can be had of approximate cost, further and much more exact surveys are required, together with complete and reliable data as to the nature of the materials through which the line will pass, and also full information as to the question of land damages, railway and road diversions, farm crossings, etc., etc.

The projected route may be briefly described as follows:—Supposing that the descent from Prescott to the International Boundary line at St. Regis is made by deep waterway canals constructed on the south or United States shore of the St. Lawrence, the channel from this point would follow generally the north side of Lake St. Francis to nearly opposite St. Zotique, from which place it would cross over to the proposed canal entrance in Hungry Bay. In this distance of about 29½ miles, there is generally a depth of from 25 to 50 feet of water, and comparatively little work would be required to secure throughout the width and depth contemplated. From a point in Hungry Bay about 2½ miles west of the upper entrance to the Beauharnois Canal the line strikes inland in a direction a little north of east.

The land lying between this bay and the St. Louis River is so low that the latter is fed from the Lake by a small canal or ditch in shallow cutting. A comparatively slight rise in the surface of Lake St. Francis would overflow a large area of flat territory near its south-eastern end, and its waters would find their way not only into the valley of the St. Louis, but also into the lower part of that of the Chateauguay. This clearly indicates the best route for the first 13½ miles of the canal, or to the lower crossing of the St. Louis River, about three miles to the south of the village of Beauharnois. It is just before crossing this river that the branch to Lake St. Louis strikes off from the main line. It will be about 3 miles long, and in this distance the descent of 82½ feet will be made by three locks to a point on the shore about midway between Beauharnois and Melocheville, where a good entrance can be had. From this point, through Lake St. Louis to the head of the Lachine Canal (13½ miles), a 25-foot channel can be formed with comparative ease, and the canal itself might be deepened so as to permit of the passage of vessels drawing 20 feet; thus connecting the deep waterway system

with the 27½ feet channel for ocean steamers, which reaches inland to the Harbour of Montreal.

The crossing of the Chateauguay is at 18½ miles from the head of the canal, and at a favourable place for the purpose. This is the most formidable stream traversed; but the aqueduct to carry it under, although a considerable structure, will present no engineering difficulties. The river bed is about 6 feet below the bottom line of the canal. The grade to the west of this will be in cutting from 4 to 11 feet, which is favourable in many respects. It will be observed that the depth of the proposed navigation assists in rendering the present line feasible. The bottom of the canal should not be above the natural level of the ground; and shallow canals like those in vogue half a century ago to carry the level of Lake St. Francis, could not be constructed across the Chateauguay Valley except by an objectionably circuitous route.

Eastward from the crossing of this river, the line, which has hitherto run from Lake St. Francis in a direction somewhat north of east, takes a sweep past the high ground near Ste. Philomène (21 miles) and strikes nearly due east to St. Johns. In this distance of 25½ miles it crosses the small rivers St. Regis, St. Pierre, La Tortue, St. Philippe, and Little Montreal; all of which have worn deep channels in the clay slopes stretching out from the foot of the Adirondacks into Canada. These slopes, owing to their altitude, have forced the canal line to the north to find suitable ground. The rivers or creeks are nearly dry in summer, and the inclination of the land transverse to the projected route will, in many cases, give a choice of level, so that the accompanying profile can be much improved, as previously stated. The total distance from Hungry Bay to St. Johns is 46½ miles. The descent of 55 feet into the Richelieu can be made by two locks as shown.

The general character of the excavation has been roughly got at by examining the wells along the route, and it is probable that the rock to be taken out for the canal need not be much more than that necessary to form the concrete locks and other structures, and provide for the protection lining of the main line and its branch to Lake St. Louis.

Between St. Johns and deep water in Lake Champlain a large amount of deepening must be done at several points in the River Richelieu to secure a channel of suitable width and depth. There is nothing yet to show conclusively the nature of the material to be excavated there, so that the cost of this work, which is about 27 miles in length, cannot be even approximately estimated.

It is not intended to go into further detail at present. Enough has been said to show that although a considerable amount of valuable information has been already obtained, a great deal is yet wanted before a reliable opinion can be given as to the outlay required to secure a channel of the dimensions stated through Canadian territory. The additional sum required for these surveys is, in my opinion, not less than \$10,000. There are four profiles and maps made in connection with this subject which are now being lithographed, and will be ready for the next meeting of the International Commission, which, it is understood, will be held in Montreal some time in the early part of next month.

The surveys made under the recent vote were in charge of B. D. McConnell, M. Can. Soc. C. E., who faithfully and intelligently discharged the duties entrusted to him.

In conclusion I may say that should the \$10,000 mentioned as being required, be appropriated during the coming Session of Parliament, a good deal of field work can be done this fall, and much additional data collected.

I am, sir,

Your obedient servant,

(Sgd.) THOMAS MONRO, M. Inst. C.E.,

O. A. HOWLAND, Esq., M.P.P.,
Chairman D. W. W. Commission,
Toronto, Ont.

Deep Waterways Commissioner.

**MEMORANDUM AS TO APPROPRIATION OF FUNDS TO ACCOMPANY
SECOND INTERIM REPORT OF 20th AUGUST, 1896.**

SIR,—In respect to the appropriation of the funds placed at the disposal of the Commission, I have the honour to report as follows:—

There was appropriated by Parliament to the purposes of	
Commission the sum of	\$5,000.00
Less fifty cents discount on cheque received at Detroit....	.50
	<hr/>
	\$4,999.50

Of which has been expended in surveys, as per	
accounts rendered and filed with the Railway	
Department by Mr. Thomas Monro.....	\$2,579.58
Appropriated for cost of lithographing	400.00
Seal, stationery, telegrams and clerical services,	
per Chairman.....	56.15
	<hr/>
	\$3,035.73

Advances to be accounted for for travelling and personal expenses of Commissioners, in attending meetings at Ottawa, Detroit, Montreal, Niagara Falls, and Toronto, in inspection by Mr. Monro at New York of Dutton system of locks and at Chicago of works of drainage canal, in supervision of survey operations, in conferences by Mr. Keefer with steamship and commercial authorities at Montreal, and in telegrams, postages and clerical disbursements, as follows:—

Chairman.....	\$521.15		
Mr. Keefer.....	450.00		
Mr. Monro.....	923.30	1,894.45	4,930.18

Leaving a balance of..... \$ 69.32

This balance will be chargeable with personal expenses of the Commissioners incurred at the recent meeting at Montreal to an amount slightly exceeding this sum.

In regard to specific accounts by the Commissioners of their personal expenditures, it was represented by the Commissioners to the Government, in commencing their work, that it was impracticable for them to keep account of petty details of daily travelling expenses and that they would prefer that the Government should fix some daily commutation for all living and petty personal expenses while travelling over and above railway fares. It was understood by the Commissioners that this principle would be recommended by the then Premier, the Hon. Sir Mackenzie Bowell, as a fair and reasonable principle and they would once more ask that some principle for the account should be thus settled by the Government.

All of which is hereby duly certified and submitted.

O. A. HOWLAND,

Chairman.

To the Honourable the Secretary of State.

REPORT OF COMMISSIONERS

ENGINEER'S OFFICE,

COTEAU LANDING, P.Q., 2nd October, 1896.

SIR,—I send you by express, lithographed copies of plan and profiles connected with the Canadian Deep Waterways Commission.

Should it be decided that the St. Lawrence River offers the most advantageous route between the Great Lakes and the Atlantic sea-board, it is believed that the information contained in these documents will be of essential service. It may also be said that a large amount of work has been done for a small outlay. The possibility of forming a canal capable of passing vessels of 20 feet draught between Lakes St. Francis, St. Louis, and Champlain, at a moderate cost, considering the magnitude of the dimensions, has been practically demonstrated.

I am, sir,

Your obedient servant,

THOMAS MONRO, M. Inst. C.E.,

D. W. W. Commissioner.

To Hon. R. W. SCOTT,
Secretary of State,
Ottawa, Ont.

OTTAWA, 14th October, 1896.

SIR,—I have the honour to transmit herewith the lithograph plan and profiles referred to in the report of this Commission of August last and forwarded to you by the Chairman, Mr. O. A. Howland, M.P.P., of Toronto.

I have the honour to be, sir,

Your obedient servant,

THOS. C. KEEFER.

The Honourable RICHARD W. SCOTT,
Secretary of State,
Ottawa.

16th October, 1896.

SIR,—I have to acknowledge the receipt of your letter of the 14th instant, transmitting the lithograph plan and profiles referred to in the report of the Canadian International Deep Waterways Commission which you mention.

I have the honour to be, sir,

Your obedient servant,

JOSEPH POPE,

Under-Secretary of State.

THOS. C. KEEFER, Esq.,
Canadian International Deep Waterways Commission,
Ottawa.

OTTAWA, 12th June, 1897.

SIR,—I leave for Halifax on 15th, and am uncertain whether the report of this Commission will reach you from Toronto before that date.

It has been signed by Mr. Monro and myself and forwarded to Mr. Howland to be transmitted by him (as Chairman) to you. The report contains the following, re Finances :—

“If it is the desire of the Government further to contribute to this international enterprise, we recommend that a sufficient sum be appropriated to be used if required, so that if Congress continues an International Commission and provides the means to complete its work, Canada may be in a position to proceed with the surveys and estimates in that portion of the route which lies within her territory.”

I am unable to say how much is required to cover expenses of the Commission since the appropriation was exhausted, but suppose the Chairman will send in the accounts which have been forwarded to him, almost immediately. Whatever else may be provided for, I assume these arrears will be, and as I understand the session will soon close, and have seen as yet no provision in the Supplementaries, I venture to hope the matter may not be overlooked should our report be delayed.

I have the honour to be, sir,

Your obedient servant,

THOS. C. KEEFER.

Hon. R. W. Scott, Senator,
Secretary of State,
Ottawa.

Th

18
giv
Ja
co-
rep
St
St
Ja
at

a l
the
sec
du

by
the
the
Ch
and
ore
Co

ast

" I
and
con
de
Ch
cha

for
no
con
the
int
An
rea

pra
sho
dee
he

REPORT OF THE COMMISSION.

OTTAWA, 17th June, 1897.

The Honourable R. W. Scott, Senator,
Secretary of State,
Ottawa.

SIR, —The undersigned, Commissioners appointed by Order in Council November, 1895, had the honour, in their interim reports of March and August of last year, to give an account of meetings with their American colleagues at Detroit and Niagara, in January and July, 1896, and of the work done and in progress at those dates in co-operation with the United States Commission. Your Commissioners have now to report a third meeting held at Detroit, in December last, by invitation of the United States Commission, preparatory to the reports of both Commissions. The United States Commissioners presented their report to the President of the United States in January last, and it has since been printed and distributed. It has also been reprinted at Ottawa and is appended to the Report of the Minister of Railways and Canals.

This report is most important in that it asserts the entire feasibility of constructing a Deep Waterway adequate to any scale of navigation which may be required between the several great lakes and the sea-board; and, also, that it will be wise to provide for securing a channel of a navigable depth of not less than ~~20~~ feet. This was the first duty imposed on that Commission by the Act of Congress of 1895. 28

Secondly, they report that "the most eligible route" is by the Niagara River, and by canal, on the east side, from Tonawanda to Olcott on Lake Ontario; that the sea-board may be reached (from Lake Ontario) by the St. Lawrence River; and that the American sea-board may be reached by the St. Lawrence River, and via Lake Champlain to the Hudson River; or, by way of the Oswego Oneida-Mohawk Valley and the Hudson River, and that these alternative routes require complete surveys in order to compare them in all respects, and comply with the provisions of the Act of Congress as to "probable cost with estimates in detail."

For surveys \$350,000 are estimated, of which an appropriation of \$150,000 is asked for the first year.

Specifically, the matters which call for early action are epitomized under the head "Recommendations" in this report in the following words:—"That complete surveys and investigations be made, and all needful data be procured, to mature projects for controlling the level of Lake Erie, and projection to the Niagara Ship Canal; developing the Oswego Oneida-Mohawk route; developing the St. Lawrence and Champlain route; improving the tidal Hudson River, and improving intermediate channels of the lakes."

Inasmuch as New York and the Atlantic States (including all New England ones) form by far the most important market both for home consumption and for exportation, no deep waterways route which is not the best for reaching that market would be considered by the originators of this International Commission. The fact, therefore, that such a commission has been established indicates a belief, on their part, that an international route may prove to be the best, if not the only practicable one to reach the American sea-board at New York, as it certainly would be the shortest and best to reach tidewater, and also Lake Champlain with its New England frontier.

The supreme value, to the North-Western States as well as to the Canadian prairies, of an international route for deeper waterways, is that it will combine the shortest route to the Canadian sea-board, Europe, and Lake Champlain, with the broadest, deepest, and most speedily navigated waters, and, therefore, the quickest route from the heart of this northern continent to New York.

The probable route of such an international work will be one by which all the new large canals required between Lake Erie and the Hudson River will be located along the Northern and Eastern boundary of the State of New York, with the single exception of the one between the River St. Lawrence and Lake Champlain : which is the only one necessarily within Canadian territory.

The Order in Council establishing a Canadian Deep Waterways Commission declares that "this question is one of sufficient importance to justify expenditure in the direction of the inquiry indicated in the Act of Congress," and instructs us "to carry on such inquiry on the lines specified in the said Act, and to meet and confer with the Committee appointed by the President of the United States, and to report to His Excellency in Council."

No joint action of the two Commissions is provided for by either Government. The responsibility of recommending the route to be adopted, of ascertaining the cost of the same with estimates in detail, as well as of pronouncing upon the feasibility of the scheme, rests exclusively with the three persons appointed by the President of the United States, viz.:—Jas. B. Angell, LL.D., President of the University of Michigan, ex-United States Minister to China, and recently appointed Minister to Turkey; John E. Russell, ex-Member of the United States Congress, of Leicester, Massachusetts; and Lyman E. Cooley, Civil Engineer, Chicago Drainage Canal. The powers and duties of these Commissioners are defined in the law of March 2nd, 1895, in the following words:—"To meet and confer with any similar Committee which may be appointed by the Government of Great Britain, or the Dominion of Canada, and make inquiry and report, whether it is feasible to build such canals as shall enable vessels engaged in Ocean commerce to pass to and fro between the Great Lakes and the Atlantic Ocean, with an adequate and controllable supply of water for continual use; where such canals can be most conveniently located, and the probable cost of the same, with estimates in detail; and, if any part of the same should be built in the territory of Canada, what regulations or treaty arrangements will be necessary between the United States and Great Britain to preserve the free use of such canals to the people of this country at all times; and all necessary facts and considerations relating to the construction and future use of deep water channels between the Great Lakes and the Atlantic Ocean."

The above instructions for the American Commission are fully set forth in the Order in Council appointing the Canadian one, and we are directed "to accept the Order in Council as our instructions," and thus empowered to co-operate with the United States Commission.

The United States Commissioners, in their report, say of their investigations:—"They are tentative in part and ignore the boundary line, and are intended to present in logical sequence the leading considerations which determine the choice of routes, and the character of an enterprise, as well as the collateral bearing of the same." This is the spirit in which your Commissioners have been met throughout by their United States colleagues, and it appears to us to be the proper spirit to give effect to the true intent of an international commission of this nature.

It would, moreover, be premature for the Canadian Commission now to deal with the many important questions which are involved in so great a proposition from an exclusively Canadian standpoint, unless and until specially instructed by its own Government to do so, because we cannot yet assume the continuance of the American Commission, which has expended its appropriation, and made its first report as hereinbefore referred to. Until Congress adopts that report and makes provision for complying with the terms of the law of 1895, and similar action is taken by the Government of Canada, both Commissions (unless cancelled) are in a state of suspended animation.

Your Commissioners have supplied their United States colleagues with all the information they were able to obtain with the means placed at their disposal, for an international route between Lake Ontario and Lake Champlain, and have made a preliminary survey of a trial line between Lake St. Francis and the Richelieu River, which, while it demonstrates the remarkably favourable character of the country, is not upon the shortest practicable route between Lake St. Francis and Lake Champlain,

within Canadian territory. If the International Commission is continued, such a survey will be needed, accompanied by all the information necessary "to estimate the cost in detail," as well as a survey of the same character for the extension of this international deeper waterway, upon the best route, from Lake St. Francis to Montreal. To this extension no special reference is made in the report of the American Commissioners (possibly in order to emphasize the New York terminus for an international route), but they point out that it is practicable "to construct in separate sections so that benefit shall follow closely on expenditure." Thus, the completion of the Niagara Ship Canal would bring Lake Ontario into communication with the great steel fleet above Niagara (which is valued at many tens of millions), 300 of the vessels of which are unable to pass the Welland Canal. In like manner the completion of the section between Lake St. Francis and Lake Champlain in advance of new deep water canals on the south side of the St. Lawrence, and of the connection of Lake Champlain with the Hudson River by a similar deep water canal, would bring New England at once into connection with the whole Great Lake system, although at first only on the smaller scale of the Welland Canal.

There has been no demand upon Canada for any specific contribution to this inquiry; but as the Order in Council instructed us to carry on such inquiry on the lines specified in the Act of Congress, we have hitherto assumed the duties of the Canadian section of the international route, and, should the inquiry be continued, Canada will no doubt be expected to contribute the necessary information with respect to that section of this great scheme which lies within her own territory. We hoped to have been able to present some more material which would illustrate the superiority of the St. Lawrence route, as an outlet for the large fleet imprisoned above Niagara, whether its destination were New York or Montreal, but we failed to obtain the necessary means to give effect to this purpose last year.

The general collection of facts and statistics relating to engineering questions devolved upon Mr. Cooley, the engineering member of the United States Commission, and in view of the time and money at his disposal is enormous and invaluable. The contributions of the Canadian Commission in this respect are due wholly to the labours of Mr. Monro, and to the courteous assistance of the officers of the various departments of the Government of Canada and of the Provinces of Ontario and Quebec; and these are acknowledged in the Report of the United States Commission. A memorandum by Mr. Monro relating to his contribution will be found in the appendix.

If it is the desire of the Government further to contribute to this international enterprise, we recommend that a sufficient sum be appropriated, to be used if required, so that, if Congress continues the International Commission and provides the means to complete its work, Canada may be in a position to proceed with the surveys and estimates in that portion of the route which lies within her territory.

Your Commissioners have, in the foregoing, set forth all which they believe to be necessary to show how far they have discharged the duties imposed on them, and to explain the present position of this important question; but in view of the possibility that this may be their last report, and more particularly because they have found that there is much difference of opinion and some misconception about an "International Deep Waterway between the Great Lakes and the Atlantic Sea-board," they deem it proper to give some information as to this movement, the conditions which have led up to the formation of an International Commission, and some of the reasons in support of it, as well as some reference to Canada's interest in the question, which may prove of future service. We consider this to be the more necessary since our American colleagues have already pronounced in favour both of the feasibility and desirability of this deeper waterway, and have declared that "the completion of the entire system as quickly as plans can be matured and economically executed, is fully justified." With this conclusion of our United States colleagues both as to feasibility and desirability, as well as to earliest possible completion, your Commissioners fully concur.

CONVENTIONS.

International, and deeper waterways, by other than existing routes, have been agitated for many years. As early as 1849 a convention was held in Burlington, Vermont, for the purpose of considering the connection of Lake Champlain with the St. Lawrence canals by a shorter route of larger and deeper dimensions than the Chambly Canal; in consequence of which the Caughnawaga Canal route was surveyed by the Canadian Government over 40 years ago. Opposition from the Canadian side, and the absence of any similar outlet from Lake Champlain to the Hudson River prevented further effort in that direction.

Deep water conventions were held at several points in the Upper Lake region since the General Government assumed the Michigan Canal at Sault Ste. Marie in 1881, which assumption has since led to the deepening, by that Government, of the Detroit, St. Clair, and St. Mary's rivers, for 20 feet draught at a cost of over \$10,000,000. This work was to have been completed in 1895, but in consequence of the extreme low water of that year, has fallen short of 20 feet. The effect of this deepening, however, by doubling the tonnage of the vessels, has been to "cut previous rates of freight in two," and has given strength to the agitation to extend this deeper waterway to the sea-board in the firm conviction that it will again cut existing rates (between Lake Erie and the sea-board) "in two."

After a dozen conventions had been held, at various United States cities and in the Lake region, and after two Bills had been introduced by Congressmen from Minnesota, the first of which (in 1892) invited negotiations with Canada for the speedy completion and deepening of the St. Lawrence route, a Deep Waterways Convention was called by the City of Toronto, in 1894, to which representatives from the United States lake cities were invited. These came in force and joined the Canadian delegation in the formation of an "International Deep Waterways Association," which held its first Convention at Cleveland in 1895, and from these proceedings the Act of Congress creating an International Commission originated.

UPPER LAKES TRAFFIC.

It is impossible to convey, within reasonable space, an adequate idea of the extraordinary development of inland water transportation on the Upper Lakes,—which for rapidity, extent, economy, and efficiency has no counterpart even on the Ocean. More than half of the best steamships of the United States are imprisoned above Niagara Falls, and more than half of the tonnage built in the United States in 1896 was launched upon the lakes. Of the exclusively passenger steamers, the "North West" and the "North Land" (5,000 tons displacement, 7,000 horse-power, with a speed of over 21 miles per hour, and a capacity of 550 first class passengers), built at a cost of \$700,000 each, are unsurpassed except by the recent Atlantic Liners. Of 34 steamers built in 1895-6, the side-wheel passenger steamer "Buffalo" was valued at \$375,000, and a steel "car ferry steamer" at \$300,000.

This inland water commerce has built up twelve cities on the southern shores above Niagara, five of which have over 200,000 population, one over a million, and the remainder above 20,000 each, and within these same limits there are 27 dry docks, the largest of which is on Lake Superior and is 560 feet long, 50 feet wide, with 18 feet water.

There are 63 life-saving stations upon these lakes, ten of which are Canadian. Of the 53 United States lake stations, all but five are above Niagara.

The economy of this inland water transportation is the result of deep water primarily, and, in the second place, of practically unlimited dimensions in other respects for the vessel; there being but the lift of one lock (of ample dimensions) to reach Lake Superior, and none at all between Buffalo and Chicago.

The large cargo steamers take two or three sailers in tow, each carrying thousands of tons, and, with their triple expansion engines, show a coal consumption (for the best practice) of 2 lbs. per developed horse-power per hour. Actual runs give four-fifths of an ounce of coal consumed per ton of cargo carried. Thirdly, the economy results from special port facilities, to be found nowhere else, by which loading and discharging is

per mile

effected in the shortest possible time by specially designed plant and with the least amount of manual labour. In some cases ore is excavated as in a gravel pit, by steam shovels, and dumped from the cars into the hold of the vessel. Five thousand tons of ore can be unloaded in twelve hours by the "ten leg" King plant, specially designed for this purpose.

The United States "Business Fleet" of the lakes above Niagara Falls consists of steel freight steamers and sailers valued at over \$60,000,000, some attaining a speed of 16 miles per hour, though the average is about 12 miles. The sailers are steel consortships often carrying 4,000 tons cargo, which, though using sail, depend on towing. They are fitted with a steam plant, used only for electric light, steering, and warping in and out of port. A typical freight steamer is 432 feet over all, 48 feet beam and 28 feet depth (180 feet too long, 4 feet too wide and much too deep for the Welland Canal) and is double bottomed with compartments into which water ballast can be admitted or pumped out; with triple expansion engines, cylinders 24, 39, and 63 inches in diameter and 7 feet stroke, supplied from boilers carrying 160 pounds working pressure. It carries over 5,000 gross tons iron ore on 16 feet 10 inches draught of water.

The total United States lake fleet (including that upon Lake Champlain) in June, 1896, was nearly 3,000 vessels of about 1,300,000 registered tonnage, over 1,800 of which are steamers with about one million registered tonnage. There are 300 of these above Niagara (embracing all the finest vessels of the lakes) which are too long to pass the Welland Canal locks. More than half of these are built of steel or iron, and, of the last fifty built, forty-one were of steel, and only nine of wood.

The rapid extension of steel and iron in lake ship-building is shown by the official return of vessels built on the lakes in the year ending with June, 1896, as follows:—

25 steam vessels—all iron or steel—gross tonnage	64,592
5 sail “ “ “ “	13,684
6 barges “ “ “ “	3,147
	<hr/> 81,423

The average tonnage of the iron and steel vessels on the lakes is 1,500 tons each, while that of the United States Atlantic and Gulf coast vessels is only 1,000 tons.

There are eight steel ship-building yards above Niagara, three of which are in Ohio, two in Michigan, and one each in Wisconsin, Illinois, and New York State, all but two of which were established within the last ten years.

The losses on the lakes since 1890 have been about 400 vessels with 200,000 tonnage and valued at about \$6,000,000.

IRON ORE TRAFFIC.

The iron ore trade is the primary cause of the wonderful development of the steel "business fleet" of the Upper Lakes. It has led to an increased coal trade for which it provides ample tonnage at the lowest rates, as well as to the manufacture on the spot of the steel used in boat construction.

Over 100 million tons of this ore have been mined in the Lake region within the last 40 years, 75 per cent of which has been produced within the last ten years.

The estimated capital engaged in mining and transporting this ore, by rail and water, to the 120 furnaces in Ohio, Pennsylvania, Buffalo, and Chicago is over \$230,000,000, distributed as follows:—

Capital in mines.....	\$ 96,000,000
Ore docks and equipment in Lake Superior and Lake Michigan.....	14,000,000
Mining railroads.....	32,000,000
Ore fleet.....	46,000,000
Ore docks at Lake Erie ports.....	15,000,000
Railroads to furnaces.....	28,000,000
Total.....	\$231,000,000

Sixty per cent of the iron ore used in the United States is carried upon these Lakes, and, as seen above, the ore fleet is valued at over two-thirds of the total valuation of the Steel Business Fleet (\$64,000,000) of the lakes.

Iron is the most important of the metals and the United States already claim that their production exceeds that of any other country, and, of this, Lake Superior is the most important district, as it certainly is, in situation, quantity and quality, one of the most remarkable. There are over two hundred mines in five separate "Ranges" known as Marquette, Menominee, Gogebic, Mesabi, and Vermilion, on the United States shores, besides large quantities of excellent ore on the Canadian side which has not yet been touched. The ores are "hard" and "soft" Bessemer, and "non-Bessemer," the latter of such character and variety that some are the complement of others, which, in proper proportions, produce from two non-Bessemer ores, a Bessemer blend. Analysis of 100 cargoes from four of the Ranges gives 62 per cent to 67 per cent metallic iron. (See Appendix). A portion of the Lake Superior ore goes to furnaces upon Lake Michigan, but the great bulk is brought to ten Lake Erie ports for transfer to furnaces in Ohio and Western Pennsylvania, as well as for consumption at such great steel producing points as Cleveland on Lake Erie, a city the population of which has increased four fold in less than twenty years. The annual output exceeds ten million tons, exceeding the supply from all other quarters and furnishing more than half of the 8,623,000 tons of pig iron produced in the United States in 1896. This amount equals the output of Great Britain which has hitherto held the lead both in iron and coal production. England imports much of her ore, and it may safely be asserted that there is no iron district in the world, as yet known, which can rival that around Lake Superior. This ore is water borne to Lake Erie at a cost of one tenth of a cent per ton per mile, less than one fourth the lowest railroad rate as yet. At Cleveland it meets the best coke from Western Pennsylvania, laid down there by rail from the ovens at less than \$2 per ton. Ore is sold in Cleveland for less than three dollars per ton.

Mine owners, iron and steel manufacturers, and shipbuilders have pronounced in favour of a Deeper Waterway from Lake Erie to the Atlantic; and they contend that iron ore, pig iron, coal, coke and steel steamers can be exported from the lakes by such a route and compete at tide-water with their kind from any other quarter. In fact it is boldly claimed that ore, coal, coke and limestone can be assembled on Lake Erie so as to produce steel more cheaply than it can be done in any other part of the world. It is reported that Messrs. Carnegie and Rockefeller have secured control of the Lake Superior ore production and are building a freight railway designed to carry ore, coal and coke, in fifty ton cars at the lowest possible rates, between the furnaces and coal mines, and Lake Erie.

LUMBER TRADE.

Until recently the tonnage in lumber ranked second, or next to ore in the water borne freight of the Lake region, but is not now so important to this question because but a small percentage of it seeks the sea-board; the great bulk being local for the supply of the lake cities and for shipment westward from these. There is, however, a prospective lumber traffic (which may be vastly increased by a deep waterway) in Pacific coast lumber, dropped into the waters of Lake Superior by the east bound "empties" of the overland railways.

COAL TRAFFIC.

Coal, in point of tonnage, comes next to lumber in the proportion which is water borne on the lakes, which, of course, is not half of that which is consumed at lake ports. The amount which reached Lake Erie alone, in 1894, from Pennsylvania, Ohio, and West Virginia, exceeded 11,000,000 tons, only half of which was shipped westward from these ports. With lake shore transshipment plant and the proposed freight railway on shortest route, with lowest grades and heaviest rails and structures, car loads may be increased that coal and coke can be laid down on the Atlantic sea-board, via a deep

waterway from Lake Erie, at a less rate than by any other United States route; or from any other quarter, except Nova Scotia.

THE GRAIN TRADE (INCLUDING FLOUR).

This trade though ranking hitherto below lumber, coal, and ore, in tonnage quantity, is constantly increasing, and is the most important, from the value of the tonnage and its destination, which is chiefly through to the sea-board, where its value is greatest. To it every reduction in the cost of transportation will be the most wide reaching in extent, and will directly influence the greatest number of individuals. Each reduction extends the area of cultivation in those districts (like the Dakotas and the Canadian prairies,) which are entirely dependent on the Lake Superior route, and also extends the area of attraction towards the lake route from the more southern districts having a choice of routes to the Atlantic.

The total receipts of grain (including flour at $4\frac{1}{2}$ bushels to the barrel) at North Atlantic tide water, in 1896, from the Chesapeake to the St. Lawrence was over 350,000,000 bushels, of which wheat and flour formed the largest number of bushels, or 150,000,000. Corn came second with 107 million bushels, and oats seventy-four millions—the remainder being barley and rye. New York received much the largest quantity, 145,000,000 bushels, exceeding Baltimore, Boston, and Philadelphia combined, more than doubling the receipt of any other port in every kind of grain, except corn, in which Baltimore and the Chesapeake (Newport News and Norfolk) approached her closely. Corn receipts were larger than usual at all points of export on account of the low price in 1896. Montreal, the only sea-port which can reach a lake port in the same bottom, is, in "Receipts," at the foot of the list;—is below Boston, Philadelphia, and the Chesapeake, all of which have only rail connection with the lakes or the corn belt; but exceeds both Boston and Philadelphia in "Shipments."

The receipts of wheat, corn and flour, in 1896, were:—

	Wheat. Bushels.	Corn. Bushels.	Flour. Barrels.
Buffalo.....	54,400,000	47,800,000	10,384,484
Montreal.....	9,400,000	6,600,000	1,590,000

All of Buffalo's ten million barrels of flour came by lake. Of Montreal's million and a half, only 133,000 barrels came by the St. Lawrence, while 267,000 barrels went to Ogdensburg by water.

Of the total movement to tide-water of 150,000,000 bushels of wheat and flour, Montreal received 16,600,000, about 11 per cent.

Of the total movement to tide-water of 107,000,000 bushels of corn, Montreal received 6,600,000, about 6 per cent.

Of the total 19,035,377 barrels of flour received at tide-water, North Atlantic, Montreal received 1,593,169, 8 per cent.

Of the total receipt of wheat at tide-water (65,000,000 bushels), Montreal received 9,500,000, or $14\frac{3}{4}$ per cent.

Of the 350 million bushels grain and flour received at tide-water (North Atlantic), less than 250 millions were exported, leaving for home consumption at these ports over 100 million bushels, besides interior receipts from the West which did not reach these Atlantic ports. For instance, Buffalo received 54 million bushels of wheat by lake, in 1896, New York, from all points by rail and water, only 28 million bushels. Buffalo received over 10 million barrels of flour, New York only 6 millions.

Of Buffalo's grain receipts in 1896, which were 163,400,000 bushels, there was forwarded by rail 121,000,000, and by Erie Canal 35,000,000, a total of 156,000,000; and of over 10,000,000 barrels of flour only 65,500 were forwarded by Erie Canal.

Buffalo has 52 elevators including transfer and floating ones, 16 million bushels storage capacity, and 6 million bushels elevating capacity in 24 hours. The transfer charges there upon wheat are $1\frac{1}{2}$ cents per bushel, and in New York $1\frac{3}{4}$ cents.

While 1896 was the banner year for Montreal's grain trade (including flour) the trade has been so fluctuating, and non-progressive by decades, in comparison with all other Atlantic ports that it may be classed as stationary. It first attained the twenty million mark in 1878, reached 26 millions in 1880, dropped to 16 millions in 1882, rose to 21 millions in 1886, dropped to 14 millions in 1888, rose to 28 millions in 1892, dropped to 16 millions in 1894, and for the first time in its history attained the 30,000,000 mark in 1896, when it reached 30,100,809 bushels, including pease and local receipts. Buffalo's receipts, by lake only, for the same year were 215 million bushels (including flour as grain) while Montreal's flour receipts were chiefly by rail.

The flour receipts of Montreal in 1863 were 1,193,486 barrels. This quantity was not exceeded until 1895; the receipts of that year as well as of 1896 being each 50 per cent over the average of preceding years. Until 1895 there were only 3 years in which flour receipts at Montreal reached one million barrels.

The wheat receipts at Montreal were highest in 1879 when they reached 11,313,000 bushels. This has not been equalled since.

Montreal grain receipts in 1878 were 22 million bushels nearly; in the 19 years which followed (including 1878, the first twenty million year, and the banner year of 1896) the average is less than the receipts of 1878, shewing practically no advance in the last twenty years.

There is apparently no other explanation of this failure to secure a larger share of the inland water commerce by our principal seaport, than the want of deeper waterways and therefore lower freight rates from the lakes. The larger locks of the Welland Canal have been opened with 12 feet water since 1881, and with 14 feet since 1887, and the effect has been felt at Ogdensburg; but the St. Lawrence is still with less than 9 feet.

Of 34,400,000 bushels of Manitoba wheat shipped from Lake Superior in 1894, '95 and '96, 14,800,000 were exported from New York and 4,700,000 from Montreal, the greater portion (2,498,000 bushels) in 1896.

LAKE ERIE.

There is no fresh water or salt water lake in the world the commerce of which can compare with that on Lake Erie, in annual tonnage and value, despite its almost total suspension by winter for about one-fourth of the year.

Besides being the receiving reservoir for all the water borne agricultural produce of Lakes Huron, Michigan, and Superior, and for the return cargoes for these from the East, it possesses an enormous inland tonnage distributed along its shores, in the transfer of ore and coal with a most important iron and steel industry arising out of the junction of these at many of the cities on its southern shore—along which there are distributed, within 300 miles, about a dozen cities, the receiving ports for ore and the shipping ports for coal as well as agricultural exports.

The number of vessels with tonnage owned, and ore received at these in 1896, are:—

Ports.	Vessels.	Tonnage.	Ore received.
			Tons
Toledo.....	80	29,905	301,794
Sandusky.....	96	46,375	58,667
Huron.....			226,515
Loraine.....			191,445
Cleveland.....	267	271,609	2,313,170
Fairport.....			941,446
Ashtabula.....			2,272,822
Erie.....	63	38,671	847,849
Conneaut.....			327,623
Buffalo.....	388	191,853	545,101
	804	573,413	8,026,432

The tonnage is that registered in the customs districts and includes adjoining ports. Cleveland has the largest tonnage and the highest average per vessel (1,000 tons), and her district alone embraces 20 per cent of all the United States tonnage (about 1,300,000 tons) on all the lakes, including Champlain. The Lake Erie ports have nearly half the total tonnage of the five Great Lakes, and if Detroit (which is within a few miles of the head of Lake Erie) is taken as a Lake Erie port, with her three hundred vessels of about 175,000 tons, this lake would represent about 60 per cent of the total of all the lakes.

It is claimed for Cleveland that, with the exception of the Clyde, she is the largest ship-building port, as she is the largest iron ore market in the world. Her population is said to have quadrupled in the last twenty years, being in the first rank in the United States in iron and steel production and their allied industries, as well as the chief centre of receipt and distribution of ore and coal; and also because nearly half of the population of the United States is said to be found within a radius of 400 miles.

These facts explain the strong sentiment in favour of unrestricted communication between Lake Erie and the ocean, and the combination of agricultural and shipping interests at the Cleveland Convention of 1895 and its results.

Of the eight ship-building yards above Niagara, two are in Cleveland, one at Buffalo and one at Toledo (making half the number on Lake Erie), one on the Detroit River, and one each on Lakes Huron, Michigan, and Superior.

Buffalo, the second city in population of the Empire State of New York, and the third upon the Great Lakes, is as pre-eminent in the grain, flour and cattle business as her sister city is in ore and steel.

Each of these Lake Erie cities largely exceeds in population any Canadian one. The population of Buffalo is stated at "over 365,000," and there are there 52 elevators with storage of over 16,000,000 bushels which handled 170 million bushels grain in 1896. The city claims the largest flour depot, and the largest cattle market "in the world", the receipts of flour (by lake) in 1896 exceeding ten million barrels, and of live stock over seven million head. The principal receipts by lake are flour, grain, ore, lumber, copper, pig iron, glucose, lard and pork, while the principal shipments by lake in 1896 were 2,400,000 tons coal, 1,200,000 barrels sugar, 670,000 barrels cement and plaster, and 621,000 barrels salt; aggregating nearly 3,000,000 tons.

This enormous transfer business is now threatened by a Cleveland steel fleet of barges for direct shipment from lake ports through the Erie Canal to New York. This fleet consists of a propeller (cost, \$15,000) and five 250-ton barges (costing \$6,000 each), total \$15,000. Two trips were made in 1895, successfully encountering Lake Erie storms (where an additional tug boat is used), and two or three additional fleets were put on in 1896.

NECESSITY FOR DEEP WATER OUTLET.

Experience with large vessels on Lake Erie between 1880 and 1890, and up to date, having been to reduce previous rates of freight, between Buffalo and Lakes Superior and Michigan, about one-half (representing many millions of dollars saved in transportation charges), has convinced the representatives of the hundreds of millions of capital engaged in the commerce of the Upper Lakes, that an extension of deep water to the Atlantic sea-board will effect an annual saving of more millions than will be required to pay the interest on the cost of such a work, great as that may be.

One steamer brought into Buffalo last year, 1896, 206,673 bushels corn, or 5,787 net tons; another, 176,800 bushels wheat, or 5,304 net tons. These were the largest cargoes known on the lakes.

It is also evident from the foregoing that such a waterway would only be undertaken upon the best route to New York, and Canada's interest in the question is, whether that will be an international one?

There is only one international route possible, which is that via the St. Lawrence and Lake Champlain, which is also one which permits of the extension of this deep water system to Montreal and thence to Europe on the shortest possible line. This fact,

together with the consideration that the St. Lawrence-Champlain route gives the greatest extent of wide and deep water, the least mileage of artificial channel, and the minimum of lockage has given rise to this International Commission.

Canada's interest in such a waterway is only second to that of the United States. It would give an opportunity of doing what our canals were intended to do, but have failed to do: that is, to obtain the maximum amount of the western trade for the St. Lawrence route; and, in addition it would afford a most direct navigation upon the largest scale between Montreal (as well as the Ottawa), and Lake Champlain with its New England frontier, and with the Hudson River, and New York; as also the most economical connection possible with Chicago, Duluth, and Fort William on Lake Superior.

The late John B. Jervis, one of the most distinguished engineers of the United States, the builder of the Croton Water Works, chief engineer of the New York Central and Hudson River Railway, Erie Canal and Western Railway, in his report, 13th February, 1855, thus speaks of the effect of the construction of the Caughnawaga Canal, when accompanied by the connection, on the same scale, of Lake Champlain with the Hudson River:—

"Regarding the vast magnitude which the lake trade must reach, and the extent and excellence of navigation, this route presents an inland navigation which, for grandeur in outline and for commercial importance has no equal on the globe. The idea of a vessel 500 to 700 tons loading at an inland port and proceeding (without breaking bulk) 2,000 miles, without meeting currents in either direction, to reach a port on the ocean, can nowhere else be indulged in."

Nothing shows the marvellous advance of inland navigation on the Great Lakes more than the above reference to vessels of 500 and 700 tons, now that so many are plying above Niagara, carrying 5,000 tons and over.

Some tables are appended, showing receipts and shipments of produce at St. Lawrence and Atlantic ports, as also the movement of tonnage in both directions upon the St. Lawrence, Welland and Sault Ste. Marie Canals; and freight rates on grain from the Upper Lakes to tide-water for a series of years.

A memorandum prepared by the Chairman of this Commission relating to treaty arrangements necessary in connection with an international route—as referred to in the Act of the United States Congress, and also in the Canadian Order in Council thereon—was submitted to and approved by the U. S. Commission at their last meeting at Detroit, and is, at their request, attached to this Report as Appendix A.

O. A. HOWLAND,
THOMAS MONRO,
THOS. C. KEEFER.

LIST OF APPENDICES.

A. Memorandum of Chairman of Commission, respecting treaty arrangements necessary for an international route.

B. Memorandum by Mr. Monro respecting surveys.

STATISTICAL TABLES.

1. Flour and grain received and shipped at Montreal, 1893, 1894, 1895, and 1896.
2. Receipts of above by rail and canal, Montreal and New York, same years.
3. Receipts and shipments of above at Montreal and six Atlantic ports, 1892 to 1896.
4. Receipts and shipments at Atlantic and Gulf ports compared with Montreal in 1896.
5. Receipts at New York by all routes showing percentage by each route in 1895 and 1896.
6. Arrivals of grain at Montreal by canal and railway for 14 years.
7. Through traffic between Montreal and Lake Erie, 1881 to 1896.
8. No. of vessels, total tonnage, and U. S. transit tonnage, Welland Canal, 20 years.
9. East and west bound U. S. transit tonnage through Welland Canal, 15 years.
10. Details of articles of U. S. transit tonnage through Welland Canal, 26 years.
11. Transshipment of grain in Canadian and U. S. vessels at Kingston, 13 years.
12. Details of traffic through Welland Canal for 26 years.
13. Details of traffic, Welland, St. Lawrence, and Sault Ste. Marie Canals, 1896.
14. Details of commerce, Sault Ste. Marie Canals, U. S. and Canadian, 1895 and 1896.
15. Iron ore trade, Lake Erie ports, 1892 to 1896.
16. Analysis Lake Superior iron ore.
17. Grain freight rates from Upper Lakes to tide-water, 1887 to 1896.
18. Canadian wheat shipped from Lake Superior, 1894, 1895, and 1896.
19. Canadian wheat, oats, and barley from Lake Superior with destination in 1896.

APPENDIX A.

ON AN INTERNATIONAL COURT.

MEMORANDUM.—*Submitted by Chairman of Canadian Commission and Approved by the International Commission.*

DETROIT, 21st December, 1896.

By the terms of the Commission issued by the President of the United States under authority of Act of Congress, which terms have been followed by the order of the Governor General in Council appointing and determining the functions of the Canadian Commissioners, it appears that it is only after it has been found that a canal for ships of sea-going capacity will in respect of the Territories upon which it must be constructed partake of an international character, and only in that event, that the Commissioners are to report what international arrangements will be necessary to secure the use of the canals to United States ships and commerce.

As it appears by the present report of the United States Commission that the primary question of the necessity of a route international in character cannot at present be determined, until means have been provided for complete surveys of all the possible routes, it is obvious that it would be premature to enter upon the consideration of the general terms and treaties that would be necessary to carry out a scheme of an international character.

There is, however, one portion of this postponed subject to which circumstances seem to make it proper to devote some attention at this stage.

It is demonstrable that the acceptability to both nations of any international terms or arrangements will be materially influenced by the existence or want of satisfactory machinery for preventing or settling disputes that might afterwards arise in the interpretation and execution of any treaty embodying the international arrangements. This branch of the subject will apparently involve a consideration of the possibility of the establishment of a court of law or arbitration for the settlement of such and other matters of difference between the British Empire and the United States.

In view of the fact that it has been announced that negotiations are pending between those two Governments on the subject of establishing a permanent court of some nature, it would appear to be proper that the Commission should lay before those authorities in connection with their present report, any suggestions which may occur to them to be of importance as to the scope, form and possibilities of such an institution, in so far as it may relate to the subject of the labours of this International Commission.

As popular acceptability is no unimportant element in the consideration of any scheme to be established by treaty, it will seem proper in the first instance to call attention to certain views which have already been under consideration by certain large popular conventions, which although of a voluntary nature, had in the elements constituting them, a considerable representative character. The first of these assemblies was an international gathering which took place at Toronto in the month of September, 1894. The second was the meeting known as the Mississippi Congress held at St. Louis later in the same year, and constituted by delegates of commercial bodies and municipalities from a very wide area in the Western States.

The third meeting was the first annual Convention of the International Deep Waterways Association held at Cleveland, Ohio, in September, 1896, at which were present a very large number of men of commercial, legal and political eminence, includ-

ing representatives in many cases officially appointed from the Governments of States, Cities, Chambers of Commerce, and other Commercial bodies and Municipalities, derived from sixteen States of the Union and eight Provinces and Territories of the Dominion of Canada. Members of both Houses of Congress, of State Legislatures, of the Parliament and Provincial Legislatures of Canada, and eminent members of the legal profession were among the delegates.

At each of these three popular assemblies the subject of the necessity of an International Court between the United States and Great Britain was made a leading subject of discussion, and the following resolution (originating at the first mentioned convention at Toronto) was unanimously adopted by all three conventions:

"Resolved, that as a preparation for the joint promotion of common interests, it is desirable that a permanent Court should be constituted for the decision by rules of law of all questions of an international character which may in any wise arise between the peoples and Governments of the British Empire and the United States."

By the Mississippi Congress the words "and Mexico" were added to the resolution. At the Convention of the Deep Waterways Association at Cleveland the foregoing resolution was emphasized by an additional clause in the platform as follows:

"That special and renewed attention is called to the desirability of establishing a permanent International Court, as set forth in the organizing convention in Toronto in 1894."

This latest resolution seems more important, from the fact that it followed upon a very elaborate presentation, in the President's opening address to the Convention, of the reasons for the adoption of the principle, and discussion in some detail of the necessity, practicability and form of the Court referred to in the resolutions.

The views thus expressed may therefore be considered to be approved by this last Convention, in its unqualified re-affirmation of the original resolution. Those views are to be found in the Official Report of the International Deep Waterways Association Convention at pages 47 to 61, a copy of which is annexed.

It will be found that they are largely directed to the following points:—

1st. That for a new international institution of this nature the relationships in constitution, legal system and mutual interests between the British Empire and the United States make those two States a peculiarly appropriate field for the experiment.

2nd. That the institution should take the form of a permanent Court, and not of appointees *ad hoc*.

3rd. That its members should be, at least in the main, appointed from, and perhaps by, the Supreme Appellate Courts of the two States. (This principle would not be violated by the addition of a minority of special assessors, either generally or for special cases.)

4th. That the Court should follow the model of a domestic judicial body, like the Supreme Court of the United States in preference to the model of Arbitration tribunals; in other words, that the decisions should be given by permanent members of the Court belonging to the judiciary of the two nations, and not by an arbitrator appointed by or selected from some foreign nation.

5th. That if these conditions are observed, it is argued that the Court would constitute a federal union for judicial purposes between the two countries, and produce on that account the best guarantee for the decisions of the Court commanding respect and obedience by both nations, even if their enforcement be left as now to local legislative and administrative action.

While the time has not arrived, nor has the opportunity existed for the Commission to ripen its views upon this extremely weighty matter, to the point of expressing definite recommendation, it feels that it is performing a duty in calling the attention of the proper authorities to these expressions of opinion from so many popular bodies, and also to the reasoning which appears to have commanded their approval.

The Commission would make one further observation. The hesitation which is likely to be felt at entering into binding treaty obligations on the subject of a permanent International Court seems most likely to arise from doubts as to the effectiveness of decisions given by such a tribunal. Its decisions would from the nature of the case approximate more nearly to the recommendations of a presiding judge to a jury on

matters of law on which their finding was to be based, than to decrees of an ordinary court which the superior power of the State as a whole may be invoked to execute against individuals and localities. There can be no corresponding power to carry the findings of a joint court into execution in the territories of one of the two nations concerned. The assurance of execution and obedience must rest in the last resort upon the assent of the people of the two nations. This assent is more likely to be given to the action of a judicial institution, forming a point of unconstitutional union and mutual confidence, than to the action of a body having foreign constituents to any extent, and by its very existence marking division and distrust rather than a union between the two peoples concerned. On the other hand, were it made generally understood that the court constituted a permanent principle of union, in the same manner as the Supreme Court of the United States is an element of the federal union of those States, by providing for the observation of mutual justice between the subjects and Governments of the two greater States, then the problem of securing obedience to its decrees would be greatly simplified. Actions of States must take place through acts of persons as agents and a procedure might be framed and executive power provided which would give effect to decrees by operating mandatively or prohibitively upon the acts of individuals. Such acts would then become unlawful and thenceforth fall under the purview of the local courts of original and appellate jurisdiction.

While local partiality sometimes in fact interferes with the course of justice where claims of subjects and foreigners are in conflict, it would be a too tremendous indictment to allege that justice is not now rendered in the majority of such instances. And it is to be observed that the very tendency of the institution, of a common court of law, if constituted upon the principles proposed, would be in time to obliterate in contentions between subjects of these two nations the invidious distinctions and jealousies of nationality.

The vast importance of such a result to the happiness of the two peoples, and to the cause of civilization, coupled with its connection with the matters submitted to this Commission, seem to justify the respectful submission of those representations for the consideration of the respective Governments.

APPENDIX B.

MEMORANDUM.

SIR,—I beg to submit the following brief synopsis of technical information prepared by me with a view of aiding the United States Deep Waterways Commissioners in their researches: also some remarks descriptive of the surveys, &c., made of that part of the route between Lake Erie and the Atlantic sea-board which must pass through Canadian territory should the line via the St. Lawrence-Champlain be adopted.

LEVELS.

A system of precise levellings was begun some years ago by the Public Works Department of Canada with a view of determining mean sea level in the Gulf of St. Lawrence and which should serve as a datum for all interior heights. These operations have not been carried westward of Lachine and are therefore not available for the River Canals. In 1875-6 an attempt was made by the United States Army Engineers to fix, with some degree of accuracy, the heights of the Great Lakes above mean sea level at New York. The results showed the mean surface of Lake Ontario 1860 75 to be 246.61 feet over that plane. It is not considered necessary to refer to these levels further than to state that in connection with them a B. M. was fixed by the United States Coast and Geodetic Survey at Rouse's Point, N.Y., the height of which is stated to be 110.06 over mean tide at Governor's Island, New York Harbour. When, in 1891, I was engaged in making surveys for the Soulanges Canal, it was determined to connect this B. M. with the head of the Beauharnois Canal, where records of the height of the water in Lake St. Francis had been kept since 1849, and then continue these levels up the River St. Lawrence to Lake Ontario, where the circuit could be completed with the mean level of the lake previously stated as 246.61 above datum.

This was of some interest, as a serious error was known to exist in the accepted heights between Lake St. Francis and Kingston.

The results may be stated in a few words.

The levels run between Rouse's Point and Valleyfield showed the mean level of Lake St. Francis to be 154.80 over the sea. Therefore the fall in the St. Lawrence between Kingston and the head of the Beauharnois Canal should be 246.61 — 154.80 91.81. But the official reports showed a fall of 92.67 feet in the river and canals between Prescott (60 miles east of Kingston) and Lake St. Francis; and it was also supposed that the fall in the river between Kingston and Prescott was from $3\frac{1}{2}$ to 5 feet, although this does not ever seem to have been measured instrumentally.

Levels run under my direction in the winter of 1894-5 made the fall between Kingston and Prescott to be about three tenths of a foot; a result which accords fairly well with the observed velocity and discharge of the river. The lines between Lake St. Francis and Kingston were run in opposite directions by two observers with ordinary wye levels. It is not pretended that they are levels of "precision," but when any discrepancies were found, the work was done over again—in many cases several times. The circuit 91.81 having closed with only a slight error, the results may be considered fairly reliable and can be accepted until the accurate levels of the Public Works Department shall have reached eastward to Lake Ontario. A great deal of work was also done in endeavouring to establish extreme low water surface of this lake. The records at Charlotte, Oswego, Port Dalhousie, Toronto, and Kingston were obtained and the results sent to the United States Commissioners. The levels of the canals and river reaches of the St. Lawrence are shown on the lithographed profile which accompanies this memorandum. The profile is of peculiar interest, as it shows the surface of the St. Lawrence at its lowest known stage in November, 1895. It will be observed that there was then only about 12 $\frac{1}{4}$ feet on the mitre sill of some of the "enlarged" canals.

SURVEYS.

At a meeting of the Commission held in Toronto on the 16th May, 1896, I was authorized to expend about \$2,500 in making preliminary surveys for a line of canal between Lakes St. Francis and Champlain. This was accomplished in May and June. The line starts from the lower end of the lake in Hungry Bay, about $2\frac{1}{2}$ miles west of the head of the Beauharnois Canal. From thence it runs in an easterly direction across the valleys of the St. Louis and Chateauguay rivers. It skirts the high ground near Ste. Philomène, then bends almost due east and strikes for St. Johns on the Richelieu River into which it descends by two locks of about 28 feet lift each. At the 13th mile from Lake St. Francis a branch $3\frac{3}{4}$ miles long runs north to Lake St. Louis, which it reaches about $1\frac{1}{2}$ miles to the east of the village of Beauharnois. The descent of 82 $\frac{1}{2}$ feet in this branch will be made by three locks. From this point the distance across the lake to the head of the Lachine Canal is about 13 miles. By deepening the channel west of Lachine and making the canal of suitable draught for a 20-foot navigation a direct connection would be made with ocean vessels at Montreal.

The lithographed profile of this line, which was measured and levelled throughout, shows how favourable the ground is for a channel of large dimensions. Good crossings can be secured both of the St. Louis and Chateauguay rivers. The latter is a large stream and liable to heavy freshets. Between Ste. Philomène and St. Johns the numerous small rivers running north have worn deep channels in the clay. The excavation will be chiefly earth, but rock will be met with near St. Johns, and also in the branch to Lake St. Louis. A plan and profile of the Richelieu River between St. Johns and the international boundary has also been lithographed. To make this river suitable for a 20 foot navigation will require the removal of a very large amount of material, the character of which has not been wholly ascertained. A second profile has also been printed which shows the line located by Mr. J. B. Jervis in 1856. The question of connecting the St. Lawrence with Lake Champlain was fully discussed over forty years ago. The same principles will govern the location of to-day if the feed is taken, as it must be, from the St. Lawrence. The cheapest line to construct would probably be that following a contour of about 20 feet below low water of Lake St. Francis. But this would be necessarily circuitous; probably 20 or 25 miles longer than a line run in the general direction of the Canada Atlantic Railway, which would, however, involve cutting of over 100 feet in depth in rock, but would run directly for the north end of Lake Champlain. No definite conclusion can be arrived at as to the respective merits of these routes until accurate surveys and estimates shall have been made. A canal carrying with it the level of Lake St. Francis and connecting it with Lake Champlain is not practicable to the south of the international boundary line as the high spurs of the Adirondacks stretch across this into Canada—otherwise the navigation now contemplated might be carried from Lake Erie to the Atlantic entirely in United States territory.

I may also state that some rapid reconnaissances were made last year along the south shore of the St. Lawrence with a view of ascertaining the feasibility of constructing a canal there for a 20-foot navigation. There do not seem to be any insuperable difficulties in the way of this. But owing to the height of the river banks it is probable that it would involve very considerable outlay.

Yours, &c.,

T. M.

O. A. HOWLAND, Esq.,
Chairman,
Toronto.

APPENDIX No. 1.

QUANTITIES of Flour and Grain received at and shipped from Montreal.

YEARS.	FLOUR.		WHEAT.		CORN.		PEASE.		OATS.		BARLEY.	
	Shipments.		Receipts.		Receipts.		Receipts.		Receipts.		Receipts.	
	Barrels.	Bushels.	Barrels.	Bushels.	Barrels.	Bushels.	Barrels.	Bushels.	Barrels.	Bushels.	Barrels.	Bushels.
1893	849,597	984,385	8,257,087	7,098,157	9,311,755	9,070,774	1,734,918	1,895,613	4,227,636	3,218,951	306,178	60,355
1894	857,571	1,065,867	7,103,263	5,511,100	2,185,364	2,053,508	1,228,020	1,291,250	1,586,184	157,005	96,748	4,228
1895	1,613,544	1,646,768	4,441,512	3,651,311	2,582,631	2,613,838	812,242	751,199	1,672,703	13,719	117,088	2,054
1896	1,593,169	1,639,316	9,472,067	7,052,385	6,653,906	6,795,104	2,003,074	1,878,124	4,031,749	2,682,525	278,464	283,046

APPENDIX No. 2.

RECEIPTS of Grain, Flour and Meal by Rail and Canal at Montreal and New York.

	MONTREAL.				New York.		
	Rail.	Canal.	Total Rail and Canal.		Rail.	Canal.	Total Rail and Canal.
	Bushels.	Bushels.	Bushels.		Bushels.	Bushels.	Bushels.
1893. 7 months open. " " " closed	7,544,917 2,695,489	18,072,638	25,617,555 2,695,489	1893. 7 months open. " " " closed	64,769,747 34,682,545	43,076,900 758,900	107,837,647 35,441,445
Total	10,240,397	18,072,638	28,313,035	Total	99,443,292	43,835,800	143,279,092
1894. 7 months open. " " " closed	4,524,369 1,936,067	10,295,707	14,820,076 1,936,067	1894. 7 months open. " " " closed	42,129,347 36,591,464	42,608,700 423,100	84,738,047 37,014,504
Total	6,460,436	10,295,707	16,756,143	Total	78,720,751	43,031,800	121,752,551
1895. 7 months open. " " " closed	7,361,697 2,291,264	8,382,371	15,744,068 2,291,264	1895. 7 months open. " " " closed	69,890,629 33,288,761	14,011,400 678,700	83,892,029 33,917,461
Total	9,652,961	8,382,371	18,035,332	Total	103,119,390	14,690,100	117,809,490
1896. 7 months open. " " " closed	11,439,797 2,435,537	17,214,987	28,654,784 2,435,537	1896. 7 months open. " " " closed	62,314,800 55,994,421	32,517,899	94,832,699 55,994,421
Total	13,895,334	17,214,987	31,110,321	Total	118,309,224	32,517,899	150,827,120

APPENDIX No. 3.

RECEIPTS and Shipments of Grain, Flour, and Meal at Montreal and Six Atlantic Ports.

	Boston.	New York.	Philadelphia.	Baltimore.	Chesapeake— Newport News and Norfolk.	Montreal.
1892.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
Receipts	38,870,290	169,826,551	57,004,548	57,686,497		28,508,007
Shipments.....	19,646,675	102,711,159	38,158,702	53,315,352		24,355,965
1893.						
Receipts	39,269,109	145,642,673	33,761,259	46,428,878		28,313,035
Shipments.....	18,108,395	85,902,836	15,957,683	37,124,645		27,590,556
1894.						
Receipts	36,671,834	123,184,449	33,408,594	38,442,248		16,756,143
Shipments.....	17,366,605	64,097,030	12,490,377	29,521,520		14,777,487
1895.						
Receipts	35,101,290	118,707,744	27,821,535	37,622,492		18,035,332
Shipments.....	16,371,288	66,118,724	8,973,076	25,264,440		15,771,364
1896.						
Receipts	42,553,111	144,866,554	38,750,775	62,642,195	34,639,789	30,100,809
Shipments.....	24,540,764	89,690,648	17,065,653	53,248,633	34,639,789	27,847,821

APPENDIX

RECEIPTS AND SHIPMENTS of Grain, Flour and Meal (in bushels at compared with those at

	FLOUR.		WHEAT.		CORN.		OATS.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
New York	28,368,607	20,895,975	28,264,697	21,766,960	29,162,950	18,801,794	42,907,750	16,453,018
Baltimore.	16,585,884	13,796,302	7,592,041	6,589,856	27,724,535	26,382,182	10,428,859	6,919,518
Boston.....	10,731,235	6,558,867	13,427,724	9,838,955	9,805,873	5,893,209	8,092,908	1,919,677
Philadelphia....	14,930,711	2,943,567	5,910,920	4,863,886	11,043,128	8,829,376	5,239,616	438,824
Chesapeake— Newport News.	7,253,784	7,253,784	17,327	17,327	10,376,625	10,376,625	3,750,054	3,750,054
Norfolk.	275,112	275,112			12,891,285	12,891,285	74,102	74,102
*Montreal.....	7,169,260	7,376,922	9,472,067	7,052,385	6,653,906	6,795,104	4,031,749	2,682,525
Totals of each article of Pro- duce at all Ports.	85,314,593	59,100,529	64,684,776	50,129,359	107,658,302	89,969,575	74,525,038	32,237,718
New Orleans....	2,463,862	1,202,693	3,852,623	3,853,837	25,989,094	25,292,502	3,046,315	262,143
Galveston.....		252,877		3,440,494		6,222,282		

* The total receipts at Montreal for 1896 are given in Appendix No. 2 at 31,100,321 bushels, by "rail and canal."

APPENDIX No. 5.

RECEIPTS at New York of Grain and Flour, in bushels by all routes, in 1895 and 1896, showing percentage by each route.

Routes.	Bushels of Grain, &c.	Percentage of Total by each Route.	Bushels of Grain, &c.	Percentage of Total by each Route.
	1895.		1896.	
N. Y. Central & Hudson R. R.	40,080,939	33.76	33,229,092	22.03
Erie R. R.	26,797,562	22.57	25,856,225	17.14
Pennsylvania R. R.	7,092,937	5.98	7,091,868	4.70
Delaware & Lackawanna R. R.	2,172,733	1.83	2,320,925	1.54
West Shore R. R.	13,220,131	11.14	21,754,095	14.43
Lehigh Valley R. R.	11,733,872	9.89	21,792,419	14.45
Baltimore & Ohio R. R.	1,177,444	0.99	1,085,514	0.72
Various routes.	843,832	0.71	4,615,725	3.06
By river and coastwise.	898,254	0.76	563,360	0.37
By canal.	14,690,100	12.37	32,517,899	21.56
Total receipts.	118,707,744	100.00	150,827,120	100.00

The remarkable change in the percentages of the New York Central and Erie roads, and of the Erie Canal, in these two years, is due chiefly to a cut of about 50 per cent in the railroad rate of preceding years between Buffalo and New York, forcing the canal rate down to an average of $2\frac{1}{2}$ cents per bushel for wheat. This was done to defeat the vote of \$9,000,000 for the enlargement of the Erie Canal, but not having the desired effect, the old rates (and old percentages) were restored in 1896.

APPENDIX No. 6.

The quantity of barley, corn, oats, pease, rye, and wheat, arrived at Montreal by St. Lawrence Canals, Grand Trunk, and Canadian Pacific Railways, for a period of fourteen years, is reported as follows:—

Year.	Via Grand Trunk Railway and Canadian Pacific Railway.	Via St. Lawrence Canals.	Year.	Via Grand Trunk Railway and Canadian Pacific Railway.	Via St. Lawrence Canals.
	Tons.	Tons.		Tons.	Tons.
1883.	98,672	263,368	1890.	119,208	242,571
1884.	142,231	174,496	1891.	184,410	320,434
1885.	* 160,821	134,824	1892.	291,680	302,899
1886.	165,613	272,133	1893.	147,610	532,084
1887.	191,760	237,881	1894.	60,666	288,015
1888.	113,794	166,191	1895.	51,114	247,550
1889.	94,943	275,414	1896.	138,296	311,389

* 1885 was the only year in which Railways brought down more than the Canals.

APPENDIX No. 7.

THROUGH TRAFFIC BETWEEN MONTREAL AND PORTS ON LAKES
ERIE, MICHIGAN, &c.

The total quantity of freight passed "Eastward" and "Westward" through the Welland and St. Lawrence Canals, from Lake Erie to Montreal during fifteen years, is as follows:—

Year.	Eastward to Montreal.	Westward from Montreal.	Year.	Eastward to Montreal.	Westward from Montreal.
	Tons.	Tons.		Tons.	Tons.
1881.....	169,213	37,190	1889.....	298,197	25,370
1882.....	108,835	24,488	1890.....	231,746	31,951
1883.....	205,394	27,488	1891.....	309,593	14,060
1884.....	168,715	9,425	1892.....	263,144	9,452
1885.....	132,968	16,115	1893.....	598,016	16,545
1886.....	244,514	16,801	1894.....	292,191	9,439
1887.....	213,834	14,075	1895.....	266,659	10,555
1888.....	183,890	19,310	1896.....	480,077	10,050

Canadian Westbound or back freight from Montreal to Lake Erie only one-twenty-sixth of the Eastbound. United States Westbound from Lake Ontario is one-third of their Eastbound.

APPENDIX No. 8.

The following statement shows the aggregate number of vessels, and the total quantity of freight passed through the Welland Canal, and the quantity passed between United States Ports during the years 1867 to 1895 inclusive.

Fiscal Year.	Aggregate Number of Vessels.	Total Quantity transported on the Welland Canal.	Quantity passed from United States Ports to United States Ports.
1867	5405	933,260	458,386
1868	6157	1,161,821	641,711
1869	6069	1,231,903	688,700
1870	7356	1,311,956	747,567
1871	7729	1,478,122	772,756
Season of Navigation.			
1872	6063	1,333,104	606,627
1873	6425	1,506,484	656,208
1874	5814	1,389,173	748,557
1875	4242	1,038,050	477,809
1876	4789	1,099,810	488,815
1877	5129	1,175,398	493,841
1878	4429	968,758	373,738
1879	3960	865,664	284,043
1880	4104	819,934	179,605
1881	3332	686,506	194,173
1882	3334	790,643	282,806
1883	3267	1,005,156	432,611
1884	3138	837,811	407,079
1885	2738	784,928	384,569
1886	3589	980,135	464,478
1887	2785	777,918	340,501
1888	2647	878,800	434,753
1889	2975	1,085,273	563,584
1890	2883	1,016,165	533,957
1891	2594	975,013	553,800
1892	2615	955,554	541,065
1893	2843	1,294,823	631,667
1894	2412	1,008,221	592,267
1895	2222	869,595	469,779
1896	2766	1,279,987	653,468

This table shows that the total tonnage, and the total U. S. transit tonnage through the Welland Canal was greater before 1870 than at any time since. It also shows that the number of vessels has been reduced to less than half, but their size is so increased that 2,766 vessels in 1896 carried more tonnage than 6,000 vessels in 1869.

APPENDIX No. 9.

UNITED STATES TRANSIT TRADE THROUGH WELLAND CANAL.

FREIGHT FROM UNITED STATES PORTS TO UNITED STATES PORTS.

The total quantity of freight passed eastward and westward through the Welland Canal, from United States ports to United States ports, for a period of fourteen years, is as follows :—

Year.	Eastward.	Westward.	Total.
	Tons.	Tons.	Tons.
1882	110,286	172,520	282,806
1883	174,012	257,609	432,611
1884	163,998	243,081	407,079
1885	168,212	216,297	384,509
1886	224,916	239,562	464,478
1887	180,427	151,074	340,501
1888	221,062	213,689	434,751
1889	297,353	266,231	563,584
1890	318,259	215,698	533,957
1891	306,257	247,543	553,800
1892	300,733	240,332	541,065
1893	384,559	247,108	631,667
1894	361,319	230,948	592,267
1895	255,259	214,520	469,779
1896	385,695	267,773	653,468

APPENDIX No. 10.

TABLE showing the Tonnage of the undermentioned Articles passed through the Welland Canal in transit between ports in the United States during a series of Twenty-six years, ended 31st December, 1895.

YEAR.	EASTWARD.						WESTWARD.							
	Vegetable Food.						Heavy Goods.							
	Flour.	Wheat.	Corn.	Barley.	Oats.	Rye.	*Other Articles.	Total.	Railway Iron.	Other Iron.	Salt.	Coal.	Dres.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1869	30,681	211,085	91,149	2,942	7,400	667	1,006	337,530	68,064	14,334	89,086	28,566	35,912	255,962
1870	10,482	124,685	89,761	1,391	1,188	3	698	243,366	24,040	13,239	49,843	45,741	50,401	242,264
1871	10,805	127,727	101,329	1,920	1,188	3	5,368	243,366	4,659	13,826	49,843	170,242	62,942	252,176
1872	8,290	229,053	125,627	2,641	5,948	500	1,920	374,226	5,749	8,941	22,898	263,673	19,651	290,895
1873	1,891	113,882	54,188	2,641	2,946	500	1,920	177,908	11	4,123	12,931	192,767	34,616	244,431
1874	5,187	96,247	58,138	1,603	1,905	525	403	162,405	8,976	5,331	29,335	167,110	25,808	227,844
1875	3,342	107,396	63,290	1,603	2,314	258	413	128,361	8,976	10,713	3,892	172,808	41,107	250,973
1876	1,316	60,026	60,026	859	277		341	128,361	2,405	3,648	6,318	118,573	17,737	148,741
1877	159	33,791	33,401	1,501	286		11	87,826	2,405	3,648	6,318	118,573	17,737	148,741
1878		30,611	16,122	1,501	286		10	48,380	4,743	3,515	571	63,945	18,390	92,964
1879		34,320	30,031	1,924	882		14	63,002	1,313	3,570		83,856	6,464	97,265
1880	107	30,227	32,433	537	731	684	8,579	132,496	1,299	6,901	8	138,352	24,891	171,161
1881	2,041	54,382	66,128	735	9,874		8,170	114,422	698	5,909		210,790	13,009	227,187
1882	1,715	40,956	53,707	732	882		118,203	118,202		1,304		198,416	13,029	215,639
1883	7,591	53,258	83,431	1,732	4,790		13,201	172,880	156	3,328	1	189,964	11,304	206,813
1884	8,563	39,999	102,974	2	26,510	179	10,859	157,330	15	4,406		82,780	627	87,828
1885	5,017	39,229	147,045	27,492	26,510		10,859	189,825	63	1,601	56	173,259	2,969	177,288
1886	9,294	31,527	180,842	6,519	17,225		11,368	296,298		1,367	896	227,476	1,294	231,163
1887	6,802	32,097	127,494	8,113	27,030		29,497	275,019		504	206	162,291	1,629	164,563
1888	11,018	26,950	131,222	6,433	36,935		26,115	253,444		576	705	186,372	1,473	189,342
1889	6,588	28,187	198,777	198,777	23,870	864	36,352	311,389		344	2	183,895		184,473
1890	17,795	53,846	100,539	28,065	27,621		60,462	198,338		297		206,827		207,171
1891	10,169	27,881	100,512	7,904	17,029		46,316	200,802		246		188,521		188,818
1892	16,224	34,878	175,064	11,128	16,137	490	131,744	385,635	181	246		149,490		149,917
1893														297,343

* Apples, meals (all kinds), peas, potatoes.

In 1896 there passed between United States ports 192,169 tons, unenumerated above, of which 75,515 was lumber downward. The grand total of United States transit trade being 653,468 tons, more than half the total tonnage of the Welland, which was for 1896, 1,279,987. Before the Welland was enlarged this transit trade reached 655,123 tons in 1874. It has taken twenty-two years to reach this tonnage again, including thirteen years of the enlarged Welland Canal.

APPENDIX No. 11.

TRANSHIPMENT OF GRAIN.

The quantity of Grain passed down the Welland Canal in Canadian and United States vessels to Kingston for thirteen years, is as follows :—

YEAR.	CANADIAN.		UNITED STATES.		Total No. of Vessels.	Total No. of Tons.
	No. of Vessels.	Tons.	No. of Vessels.	Tons.		
1884.....	111 cargoes.	70,475	117 cargoes.	75,787	228	146,262
1885.....	75 "	45,639	79 "	55,982	154	101,621
1886.....	244 "	143,330	97 "	62,222	341	205,552
1887.....	284 "	178,233	19 "	12,477	303	190,710
1888.....	182 "	143,025	60 "	43,667	242	186,692
1889.....	208 "	165,117	114 "	108,368	322	273,475
1890.....	203 "	184,275	35 "	35,560	238	219,835
1891.....	209 "	190,664	77 "	90,153	286	280,817
1892.....	158 "	159,018	89 "	109,812	247	268,830
1893.....	146 "	148,962	257 "	328,269	403	477,231
1894.....	125 "	159,145	84 "	106,236	209	265,381
1895.....	123 "	136,617	56 "	73,987	179	210,604
1896.....	196 "	227,912	158 "	217,988	354	445,900

Four vessels took cargoes of 1,344 tons through to Montreal *intact* in 1895 ; two cargoes of 810 tons in 1894 ; none in 1893 ; two in 1892 of 924 tons ; and three in 1891 of 1,441 tons. Six vessels lightened a portion of their cargoes in 1895, against 19 in 1894 ; 34 in 1893, 25 in 1892, and 44 in 1891 ; 169 vessels discharged the whole of their cargoes at Kingston in 1895, against 188 in 1894, 369 in 1893, 220 in 1892, and 293 in 1891. Of the 139 Lake vessels which went through to Montreal, 1891 to 1895, 128 lightened their cargoes, and whereas 47 went down in 1891, only 10 went down in 1895.

REPORT OF COMMISSIONERS

APPENDIX No. 12.

TABLE showing the Tonnage of the undermentioned Articles moved through the Welland Canal, during a series of Twenty-six years ended 31st December, 1896.

YEAR.	VEGETABLE FOOD.										HEAVY GOODS.				
	Flour.		Wheat.		Corn.		Barley.		Oats.		Rye.		Other Articles.*		Total.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	
1869*	45,674	313,825	120,590	20,451	...	...	...	...	...	...	...	...	...	...	503,860
1870	26,651	280,998	254,902	6,035	7,752	...	...	...	...	...	...	...	...	...	538,147
1871	30,665	355,847	180,169	8,225	1,194	...	...	...	...	...	...	...	...	...	579,880
1872	24,019	413,212	181,151	18,871	5,954	...	...	...	...	...	...	...	...	...	647,337
1873	13,964	253,835	103,749	35,751	3,383	...	...	...	...	...	...	...	...	...	417,936
1874	15,778	201,906	144,501	18,455	24,496	...	...	...	...	...	...	...	...	...	409,786
1875	13,558	253,953	103,196	19,870	2,810	...	...	...	...	...	...	...	...	...	464,181
1876	9,121	191,982	185,931	10,979	3,088	...	...	...	...	...	...	...	...	...	403,403
1877	10,710	274,570	144,506	4,655	1,239	...	...	...	...	...	...	...	...	...	448,564
1878	12,679	242,020	103,738	17,772	477	...	...	...	...	...	...	...	...	...	442,182
1879	9,959	127,882	101,073	24,309	...	...	...	...	...	...	...	...	...	...	293,395
1880	12,261	215,056	54,799	10,436	611	...	...	...	...	...	...	...	...	...	306,482
1881	13,471	152,794	182,269	7,135	...	...	...	...	...	...	...	...	...	...	373,326
1882	13,683	144,851	118,811	1,116	...	...	...	...	...	...	...	...	...	...	305,734
1883	19,471	154,169	219,442	1,595	4,911	...	...	...	...	...	...	...	...	...	414,812
1884	23,949	221,927	114,938	9,574	12,650	...	...	...	...	...	...	...	...	...	394,971
1885	16,983	160,963	194,886	5,906	...	...	...	...	...	...	...	...	...	...	419,786
1886	7,931	126,064	353,595	4,272	28,356	...	...	...	...	...	...	...	...	...	542,043
1887	14,461	118,062	327,394	10,890	27,726	...	...	...	...	...	...	...	...	...	519,291
1888	13,517	198,658	185,180	8,433	52,959	...	...	...	...	...	...	...	...	...	567,177
1889	15,255	292,019	141,062	18,399	31,293	...	...	...	...	...	...	...	...	...	595,253
1890	13,628	270,933	169,293	28,333	27,962	...	...	...	...	...	...	...	...	...	604,753
1891	44,044	293,088	164,894	8,689	18,236	...	...	...	...	...	...	...	...	...	486,421
1892	42,425	320,563	320,444	11,308	28,178	...	...	...	...	...	...	...	...	...	789,018
1893	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1894	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1895	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1896	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

* Fiscal. † Apples, meal (all kinds), pease, potatoes.

APPENDIX No. 13.

STATEMENT showing the Quantity of undermentioned Articles passed through the Welland, St. Lawrence, and Sault Ste. Marie (Canadian) Canals during the Season of Navigation in 1896.

WELLAND CANAL, 1896.

ARTICLES.	CANADA TO CANADA.		CANADA TO UNITED STATES.		UNITED STATES TO UNITED STATES.		UNITED STATES TO CANADA.		TOTAL UP.	TOTAL DOWNS.	GRAND TOTAL.
	Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.			
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.			
Barley		240									
Buckwheat											
Corn		679									
Flax-seed											
Flour	266	125									
Oats		1,528									
Pease											
Rye	439										
Wheat	290	155,339	885								
Salt	71	80	753								
Iron ore			1,138								
Copper											
Lumber	194	3,461									
Coal	20	210									
Other freight	9,553	32,617	5,740	3,133	206,093	1,255	4,127	67,371	210,240	13,205	223,445
Total, Welland	10,833	194,279	8,536	6,015	267,773	385,695	4,127	402,729	291,269	988,718	1,279,987

Ottawa, March, 1897.

APPENDIX No. 13—Continued.

STATEMENT showing the Quantity of undermentioned Articles passed through the Welland, St. Lawrence, and Sault Ste. Marie (Canadian) Canals during the Season of Navigation in 1896.

ST. LAWRENCE CANALS, 1896.

ARTICLES.	CANADA TO CANADA.		CANADA TO UNITED STATES.		UNITED STATES TO UNITED STATES.		UNITED STATES TO CANADA.		TOTAL UP.	TOTAL DOWN.	GRAND TOTAL.
	Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.			
Barley.....	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	52	3,873	3,925
Buckwheat.....		4,118								4,118	4,118
Corn.....	9	140,792						60,170	9	200,962	200,971
Flax-seed.....	1								1		1
Flour.....	926	5,638						9,041	926	14,679	15,605
Oats.....	134	29,638						1,763	134	31,401	31,535
Pease.....	50	40,811						395	50	41,206	41,256
Rye.....	261	8,077						1,457	261	9,534	9,795
Wheat.....	560	246,066						21,219	560	267,285	267,845
Salt.....	2,934	94	753				20		3,707	94	3,801
Iron ore											
Copper.....											
Lumber and square timber	15,353	32,297		1,196				998	15,353	34,491	49,844
Coal.....	69,984	37,297	4		330	30,751	143,366	100,739	100,739	180,993	281,732
Other freight	77,014	104,581	5,456	1,546	257	12,648	1,406		95,375	107,887	203,282
Total, St. Lawrence.	167,278	653,282	6,213	2,742	257	43,419	239,815		217,167	896,523	1,113,690

Ottawa, March, 1897.

SAULT STE. MARIE CANAL, 1896. (CANADIAN.)

	719					38,350		24		39,063	39,063
Barley.....											39,063
Buckwheat.....											6,174
Corn.....	1								1		6,174
Flax-seed.....	2,000								2,000		43,567
Flour.....											199,792
Oats.....	35,633										42,739
Pease.....	4,055								5		10
Rye.....									10		10,388
Wheat.....	184,908										579,427
Salt.....		297									2,793
Iron ore.....											2,492,905
Copper ore.....											14,692
Lumber and square timber.....	740										54,140
Coal, soft.....	2,972										811,980
do hard.....	10										153,369
Other freight.....	29,320										124,324
Total, Sault Ste. Marie.....	35,698	237,369	6,623	42,080	929,215	3,149,075	63,562	108,177	1,040,098	3,537,301	4,577,399

REPORT OF COMMISSIONERS

APPENDIX No. 13—Continued.

1896.

MOVEMENT OF WHEAT.

60 lbs. per bushel.	33½ bushels to the ton.	Tons.
Quantity passed through the Welland.....		317,527
Distribution—	Tons.	
Transhipped from Kingston to Montreal.....	197,245	
Prescott.....	34,005	
Ogdensburg.....	18,411	
		249,661
		67,866
Quantity taken to Toronto.....	4,616	
Portsmouth.....	1,225	
Oswego.....	2,579	
Cape Vincent.....	938	
sunk in Cornwall Canal.....	679	
		10,037
		57,829
Quantity remaining in Kingston.....	19,993	
Prescott.....	25,360	
Ogdensburg.....	12,470	
		57,829

In addition to the above quantity passed down the Welland Canal during the year 1896, there were 5,290 tons passed down from Kingston to Montreal which had been stored there in 1895.

MOVEMENT OF CORN.

56 lbs. per bushel.	35·7 bushels to the ton.	Tons.
Quantity passed through the Welland.....		320,444
Distribution—	Tons.	
Transhipped from Kingston to Montreal.....	74,512	
Prescott.....	50,815	
Ogdensburg.....	56,698	
		181,995
		138,449
	Tons.	
Quantity taken direct to Montreal.....	664	
Cardinal.....	651	
from Prescott to Cardinal.....	4,592	
Ogdensburg.....	280	
	5,523	
to Oswego.....	9,389	
to Cape Vincent.....	560	
		16,136
		122,213
Quantity remaining at Kingston.....	518	
Prescott.....	7,218	
Ogdensburg.....	114,577	
		122,313

MOVEMENT OF OATS.

34 lbs. per bushel.	59 bushels to the ton.	Tons.
Quantity passed through the Welland.....		28,178
Distribution—	Tons.	
Transhipped from Kingston to Montreal.....	3,036	
Prescott.....	7,551	
Ogdensburg.....	1,786	
		12,373
		15,805

APPENDIX No. 13—*Concluded.*

	Tons.	Tons.
Quantity remaining at Kingston.....	173	
“ Prescott.....	1,281	
“ Ogdensburg.....	14,351	
		15,805

MOVEMENT OF PEASE.

60 lbs. per bushel.	33½ bushels to the ton.	Tons.
Quantity passed through the Welland.....		3,030
Distribution—	Tons.	
Transhipped from Kingston to Montreal.....	2,360	
“ Cornwall.....	660	
		3,020
Quantity remaining at Kingston.....		10
		10

MOVEMENT OF RYE.

56 lbs. to the bushel.	35·7 bushels to the ton.	Tons.
Quantity passed through the Welland.....		8,970
Distribution—	Tons.	
Transhipped from Kingston to Montreal.....	4,271	
“ Prescott “.....	3,562	
“ Ogdensburg “.....	490	
		8,323
Quantity remaining at Kingston.....	645	647
“ Prescott.....	2	647

MOVEMENT OF BARLEY.

48 lbs. per bushel.	41½ bushels to the ton.	Tons.
Quantity passed through the Welland.....		11,368
Distribution—		
Transhipped from Kingston to Montreal.....		240
		11,128
Quantity taken to Oswego.....	Tons.	
“ Cape Vincent.....	10,000	
	936	
		10,936
Quantity remaining at Ogdensburg.....		192
		192

APPENDIX No. 15.

IRON ORE TRADE AND DOCKS.

The following Statement shows the lake receipts of Iron Ore at Lake Erie ports, during the seasons of 1892 to 1896 inclusive.

PORT.	1892.	1893.	1894.	1895.	1896.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Toledo	139,987	145,515	158,384	260,730	301,794
Sandusky	49,736	4,464	23,043	12,361	58,667
Huron	65,000	137,700	172,775	146,442	226,515
Loraine	190,400	165,667	150,424	214,219	191,445
Cleveland	1,950,244	1,260,716	1,624,573	2,312,370	2,313,700
Fairport	866,611	792,517	976,222	914,617	914,446
Ashtabula	2,555,416	1,845,738	1,987,722	2,474,791	2,272,822
Erie	645,230	469,299	624,438	811,989	847,849
Conneaut	1,130	203,207	237,905	244,967	327,623
Buffalo	197,000	308,238	305,339	719,742	545,101
Totals	6,688,454	5,333,061	6,350,825	8,112,228	8,026,432

APPENDIX No. 16.

AVERAGE ANALYSIS from 400 cargoes best Hard and Soft Lake Superior Ores.

Designations.	Metallic Iron.	Silica.	Phosphorus.	Alumina.	Lime.	Magnesia.	Sulphur.	Manganese.	Organic and Volatile Matter.
Hard Bessemer	67.55	2.05	0.041	0.35	0.080	0.111	0.028	0.124	0.48
Hard non-Bessemer	67.22	2.51	0.147	0.27	0.122	0.141	0.035	0.142	0.52
Soft Bessemer	62.68	5.90	0.040	2.09	0.224	0.142	0.030	0.440	1.78
Soft non-Bessemer	62.74	6.12	0.215	1.99	0.186	0.213	0.048	0.371	1.42

APPENDIX No. 17.

GRAIN Freight Rates from Upper Lakes to Tide Water.

YEAR.	BY RAIL AND CANAL, BUFFALO TO NEW YORK.		BY LAKE.		
	Published Rail Rate.	Erie Canal Rate, Average.	Chicago to Buffalo, Average.	Duluth to Buffalo, Average.	Duluth to Kingston, Ont., Average.
	Cents.	Cents.	Cents.	Cents.	Cents.
1887.....	7 $\frac{1}{10}$ to 9	4 $\frac{9}{10}$	4 $\frac{1}{10}$	5 to 8	6 $\frac{1}{4}$ to 7 $\frac{3}{4}$
1888.....	6 $\frac{6}{10}$ 8 $\frac{4}{10}$	3 $\frac{4}{10}$	2 $\frac{7}{10}$	2 5	4 5
1889.....	7 $\frac{1}{10}$..	4 $\frac{8}{10}$	2 $\frac{5}{10}$	2 5	.. ..
1890.....	7 $\frac{2}{10}$ 7 $\frac{8}{10}$	3 $\frac{8}{10}$	1 $\frac{6}{10}$	2 5	4 5 $\frac{3}{4}$
1891.....	7 $\frac{8}{10}$..	3 $\frac{9}{10}$	2 $\frac{1}{10}$	1 $\frac{1}{4}$ 9 $\frac{1}{2}$	2 $\frac{1}{2}$ 3 $\frac{3}{4}$
1892.....	7 $\frac{8}{10}$..	3 $\frac{9}{10}$	2 $\frac{9}{10}$	2 $\frac{1}{4}$ 4	3 6 $\frac{1}{4}$
1893.....	6 $\frac{6}{10}$ 7 $\frac{8}{10}$	4 $\frac{1}{10}$	1 $\frac{6}{10}$	1 $\frac{1}{4}$ 3 $\frac{1}{2}$	2 $\frac{3}{4}$ 5 $\frac{1}{2}$
1894.....	6 $\frac{6}{10}$ 7 $\frac{1}{10}$	3 $\frac{8}{10}$	1 $\frac{2}{10}$	1 $\frac{1}{4}$ 3	2 $\frac{1}{2}$ 4 $\frac{1}{4}$
1895.....	6 $\frac{6}{10}$ 7 $\frac{8}{10}$	2 $\frac{2}{10}$	1 $\frac{6}{10}$	2 6	3 5
1896.....	6 $\frac{6}{10}$..	3	1 $\frac{7}{10}$	1 $\frac{1}{4}$ 3	3 5 $\frac{1}{2}$

The lowest canal rate was in June, 1895, 1 $\frac{7}{10}$ c. per bushel on wheat.

The lowest lake rate was in July, 1895, 1 c. per bushel on wheat (1 $\frac{2}{10}$ c. in May and June), making total lowest freight (lake and canal) Chicago to New York, 2 $\frac{7}{10}$ c. per bushel.

The lowest lake rate, Chicago to Buffalo, was $\frac{7}{8}$ of a cent per bushel in 1894, and the lowest rate reached in 1891, 1892, 1893, and 1895 was 1c. per bushel.

Adding 2 $\frac{1}{4}$ c. per bushel transfer charges at Buffalo and New York to these lowest rates from Chicago by lake and canal, 2 $\frac{7}{10}$ c., wheat may have been put on board the ocean vessel at a total cost from Chicago of 5 $\frac{1}{4}$ c., though 6 $\frac{1}{2}$ c. is an average, the 1895 rate on the Erie Canal being due to temporary railroad policy.

The current freight rates on wheat from Lakes Michigan and Superior to Montreal by water are 2 $\frac{3}{4}$ c. and 3c. respectively to Kingston, and 2 $\frac{1}{4}$ c. from Kingston to Montreal, making 5c. and 5 $\frac{1}{2}$ c. respectively, inclusive of tolls.

The freight rates on coal from Buffalo to Chicago, Milwaukee and Duluth in 1896, were:

8th Aug. to 10th Oct.—20c. per ton.

10th Oct. to 14th Nov.—30c. per ton.

14th Nov. to close of navigation—40c. to 60c. per ton.

The average freight rate on coal from Lake Erie ports to Duluth for the past ten years was 54 cents per ton.

Ore and grain are the chief eastbound freights from Lake Superior, and the chief factors in the development of the steel business fleet of the upper lakes. The contract

rate for ore from Lake Superior to Lake Erie ports was 55c. to 60c. per ton in 1894 and 1895.

Railroad competition for east bound grain at Lake Superior is out of the question during the season of navigation, with such craft as are now available for water borne traffic.

On the other hand, eastbound shipments from Chicago, 1891 to 1895, both inclusive, show that an average of 44 per cent were by rail and 56 per cent by water, but in the last year (1895) the rail took 66 per cent and the lake 34 per cent. Ten different railways, embracing all the trunk lines, took part in this competition.

The total shipments from Chicago in 1896 were:

	By Lake.	By Rail.	Total by Lake and Rail.
Flour.....Barrels.	1,006,951	1,847,881	2,854,832
Wheat.....Bushels.	13,232,818	12,655,829	25,888,647
Corn....."	74,379,206	13,334,115	87,713,321
Oats....."	23,798,409	58,321,443	82,119,852
Rye....."	971,603	402,906	1,374,509
Barley....."	5,451,824	4,315,884	9,767,708
Total bushels Grain.....	117,833,860	89,030,177	206,864,037

The rail carried over half of the wheat, over one-third the flour, about seven-eighths of the corn, one-fourth of the oats, and more than half of the rye and barley.

APPENDIX No. 18.

SHIPMENT of Manitoba Wheat, C.P.R. Elevators, Port Arthur and Fort William.

LAKE SUPERIOR.

	New York, (export.)	Montreal, (export.)	Ontario, local.	Total.
	Bushels.	Bushels.	Bushels.	Bushels.
1894.....	5,697,113	1,612,504	3,904,031	11,213,738
1895.....	4,715,785	591,327	4,497,832	10,204,944
1896.....	4,434,514	2,498,139	*6,157,407	13,090,054
	14,847,412	4,702,054	14,559,270	34,508,736

* This includes 2,456,036 bushels for W. W. Ogilvie, Montreal.

The Corn Exchange Committee of the Montreal Board of Trade in the report of 1896, attribute the exportation of Manitoba wheat via New York to the lack of Canadian lake tonnage suitable for bringing it to Montreal. This committee suggests reciprocity with the United States in the coasting trade, or a bounty for the purpose of increasing Canadian tonnage, and in the meantime permitting United States vessels to carry grain from Fort William to Montreal for export only.

The committee says: "It is found that these 'large United States vessels plying on the Upper Lakes' can carry grain at a minimum cost, and it is necessary, if Canada is to retain the carrying trade of its own North-west, that there should be an ample supply upon the lakes of Canadian vessels of similar capacity."

Seeing that all these "large United States vessels" are unable to leave the Upper Lakes owing to the inferior dimensions of the Welland Canal, the above quotation embraces the whole "Deep Waterways" question in a nutshell.

APPENDIX No. 19.

MEMO. of Bulk Grain shipped from Port Arthur and Fort William Elevators.

SEASON OF NAVIGATION, 1896.

	BUSHELS.		
	Wheat.	Oats.	Barley.
Canadian Pacific Line.....	628,104	430,230	60,797
Beatty Line.....	383,017		
Outsiders.....	12,078,983	289,635	26,000
Totals.....	13,090,054	719,874	86,797

DESTINATION OF GRAIN.

New York (export).....	4,434,514	204,178	16,000
Montreal (export).....	2,498,133	354,526	50,838
*Ontario, local ..	6,157,407	161,170	19,959
Totals.....	13,090,054	719,874	86,797

* This item includes 2,456,036 bushels for W. W. Ogilvie, Montreal.

17th June, 1897.

SIR,—I have the honour to acknowledge the receipt of your communication of the 16th instant, transmitting the joint report of the Commissioners appointed by minute of Council of the 30th November, 1895, members of the International Commission on deep water navigation. This report shall be submitted for the consideration of His Excellency the Governor General in Council.

I have the honour to be, Sir,

Your obedient servant,

JOSEPH POPE,

Under-Secretary of State.

O. A. HOWLAND, Esq.,

Chairman, International Deep Waterways Commission,
Toronto, Ontario.

COTEAU LANDING, P. Q., 21st June, 1897.

SIR,—I understand from the Chairman (Mr. O. A. Howland) that the report of the Canadian Deep Waterways Commission has been forwarded to you.

I now send a set of lithographs to accompany and illustrate that document. In this roll you will find a sketch map of the district in Canada through which a canal must pass should an International Route be eventually adopted. On this map the line is shown which was surveyed, under my direction, in 1896. It should in my opinion be lithographed also, as it is essential to the understanding of the question and will show the extent of field work accomplished with a small money expenditure.

The map would have been lithographed but the Commissioners fell short of funds.

I am, Sir,

Your obedient servant,

THOMAS MONRO, M. Inst. C. E.,

Commissioner.

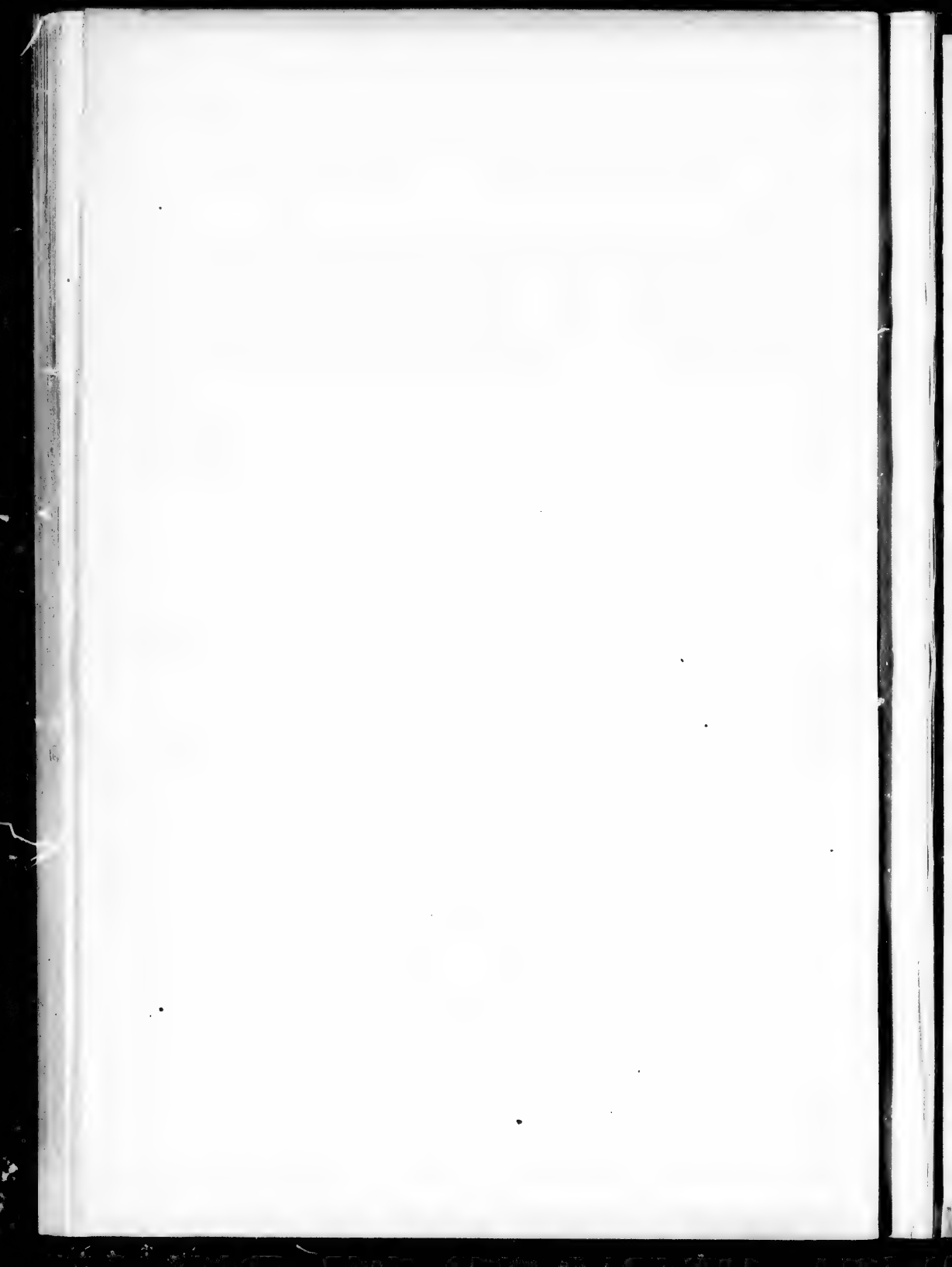
Hon. R. W. SCOTT,

Secretary of State,
Ottawa.

e
e
n
is

ne
is
at
is
e
w
s.

,,



96

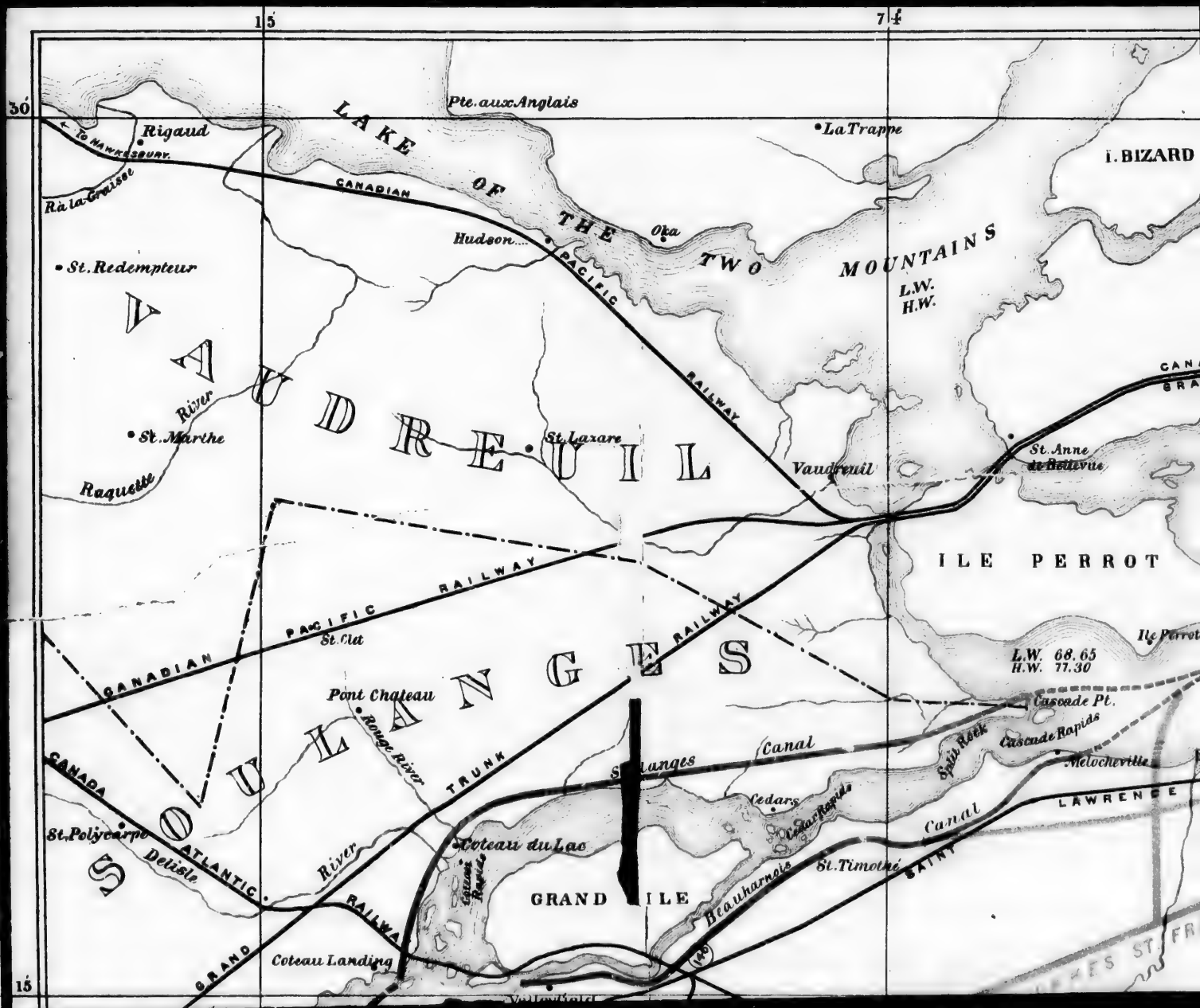
1893

DEEP WATERWAY SKETCH MAP OF THE LAKE

The elevations on this map are referred to Mean Sea Level, New York.
Along the Railway lines, the elevations have been taken from the profiles of the various roads.
Low Water of the Lakes and Rivers in the lowest recorded water, which occurred in November, 1895.

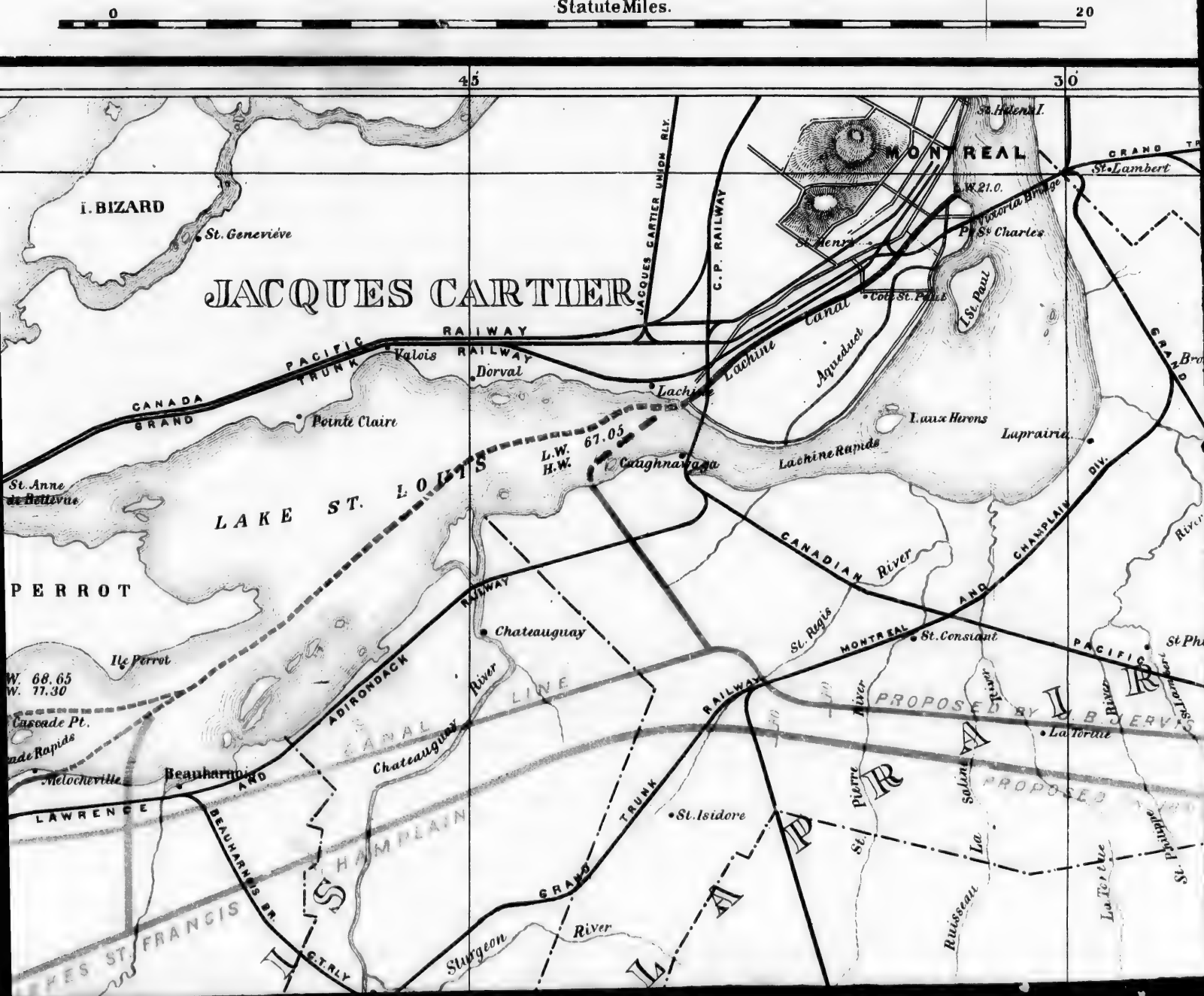
Thomas Munro. M. Ins. C.

Commissioner.



THE CANADIAN PACIFIC RAILWAYS COMMISSION — CANADA

SCALE
Statute Miles.

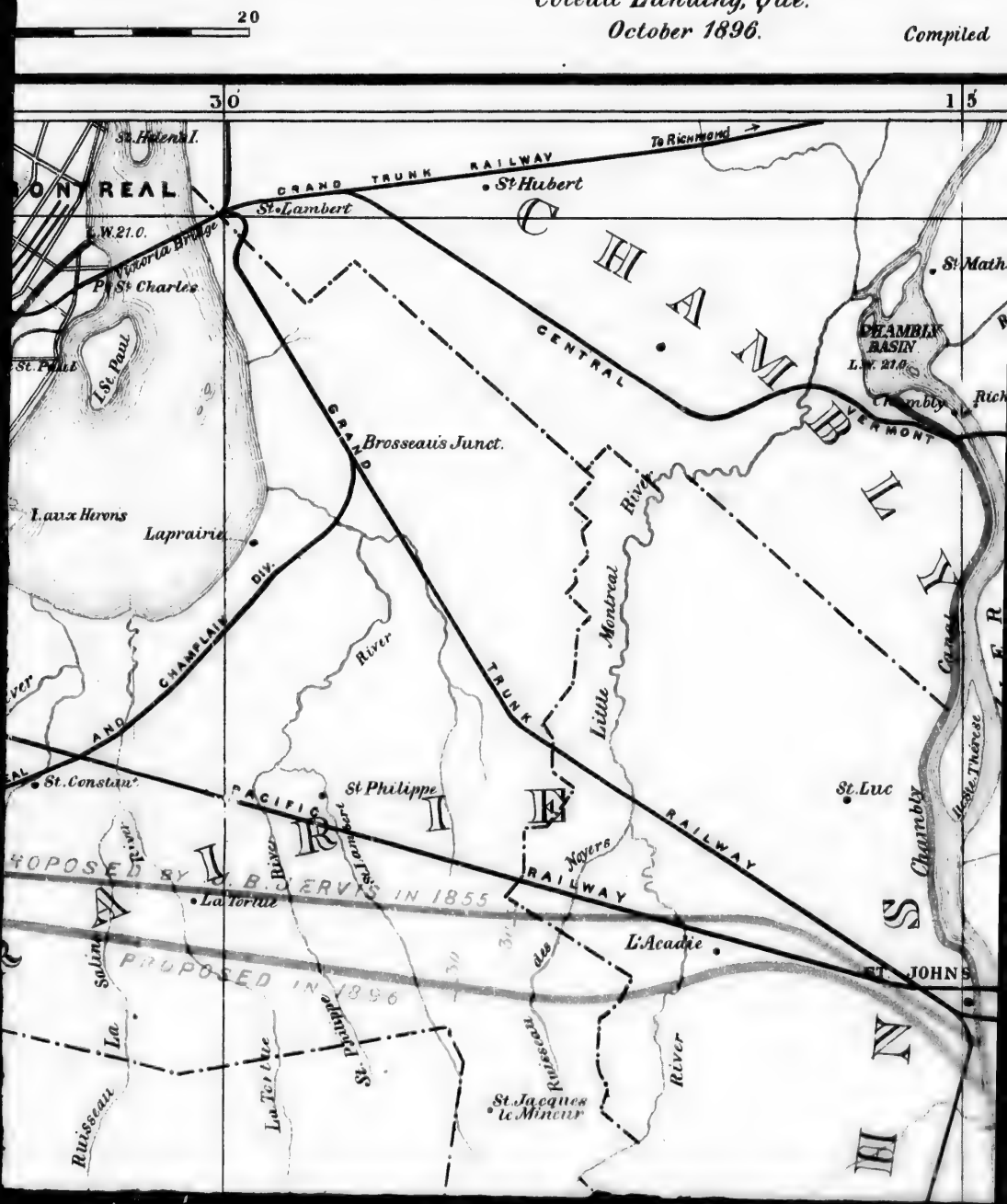


N — CANADA — 18

HELIEU RIVER DISTRICT

*Coteau Landing, Que.
October 1896.*

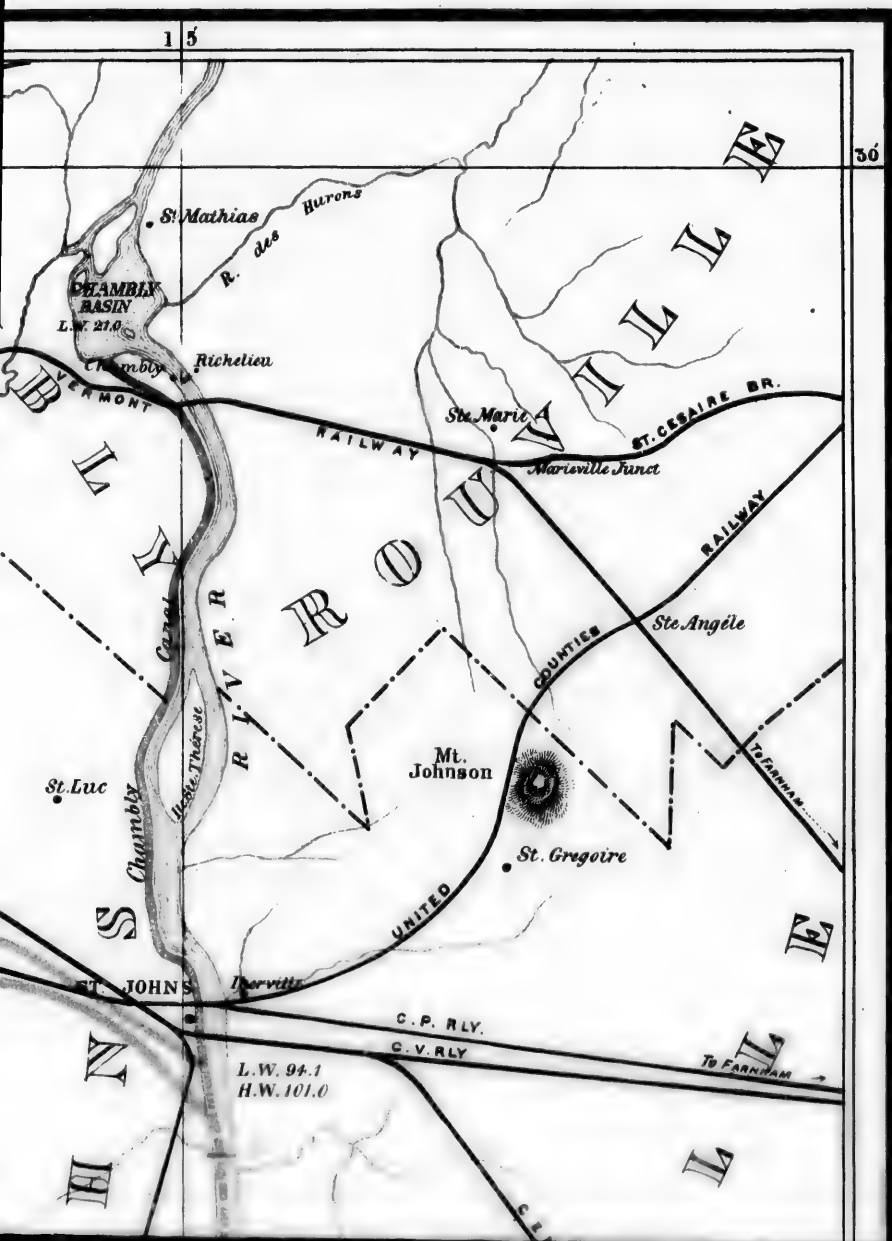
Compiled

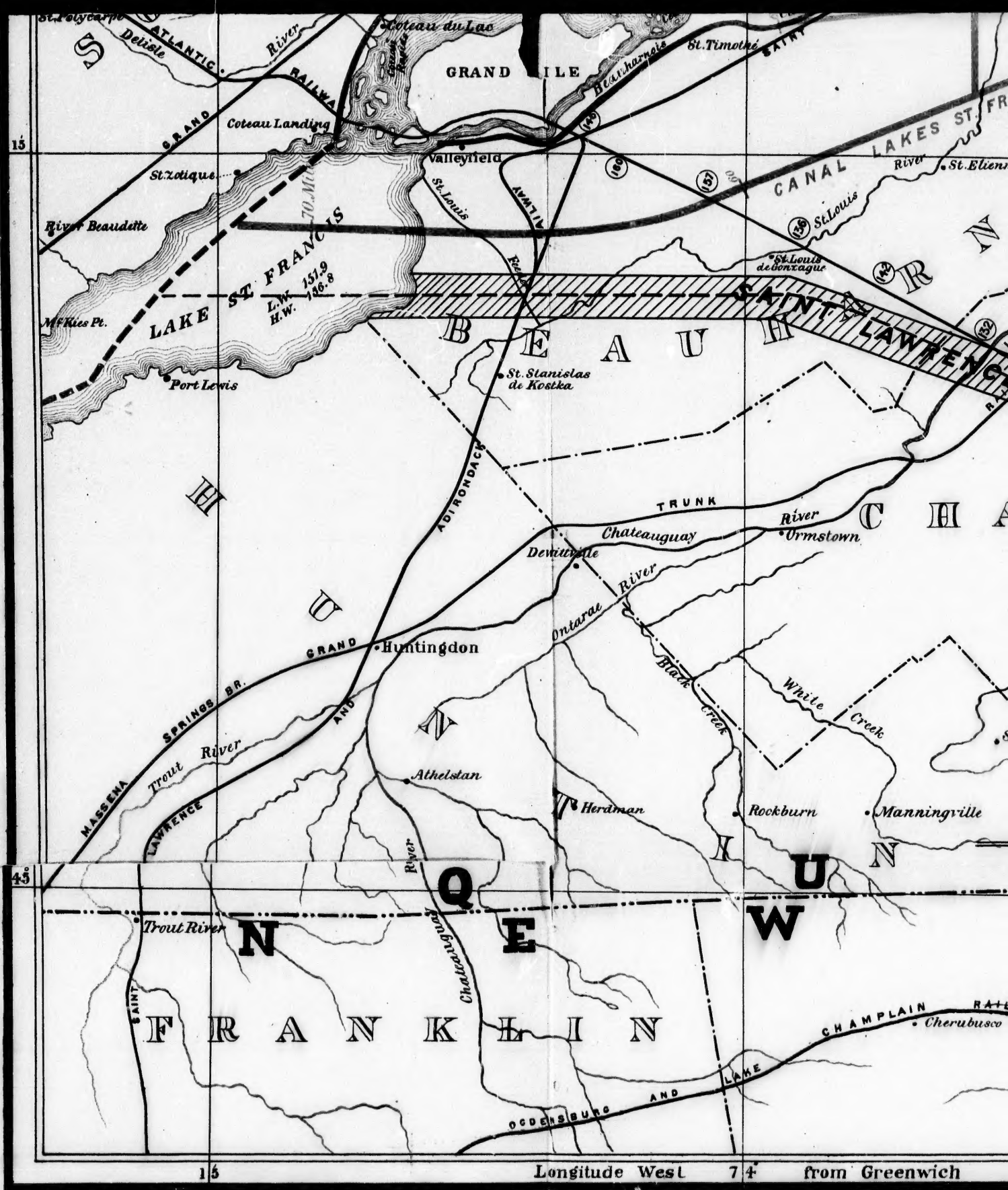


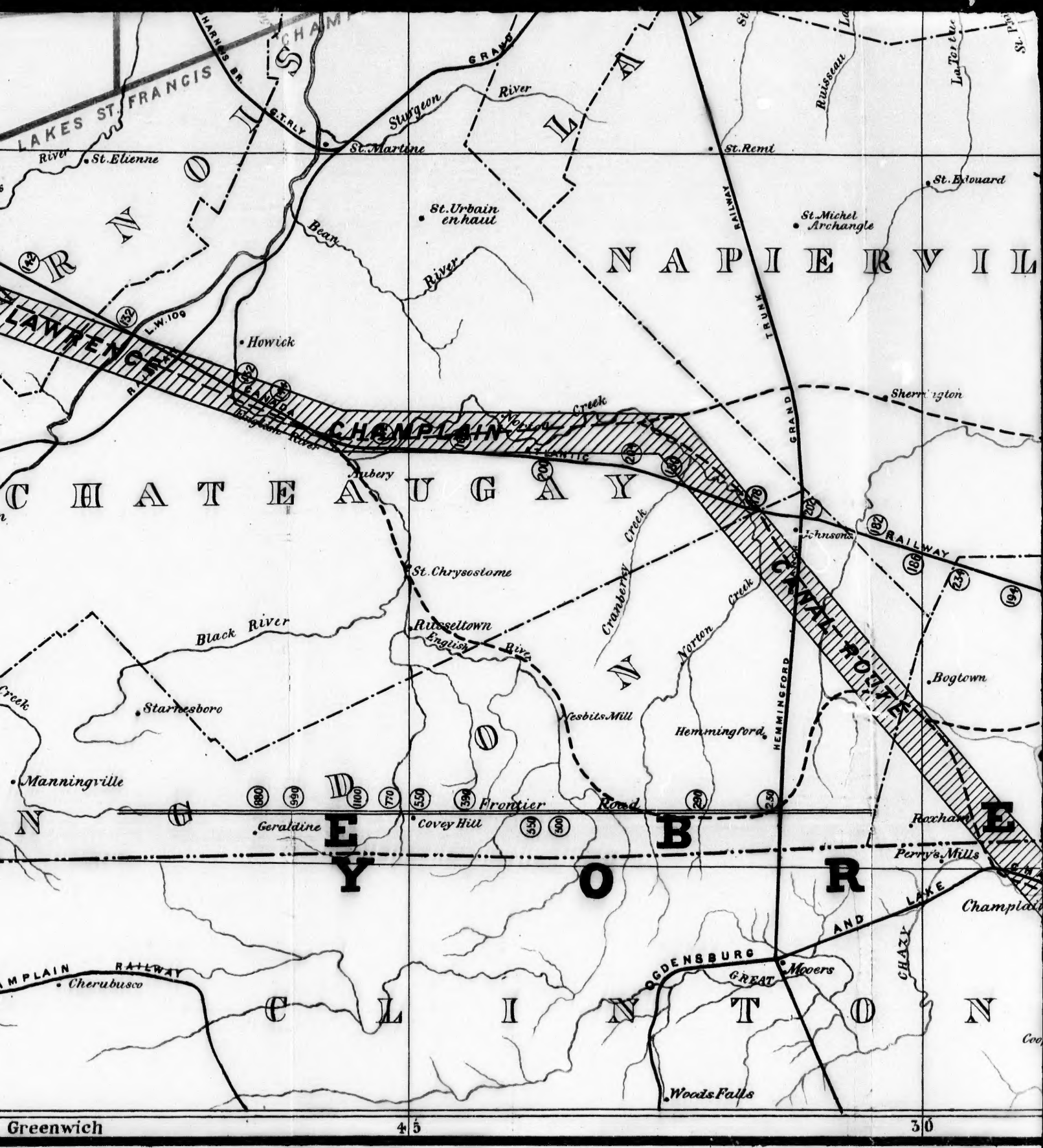
1895 DISTRICT

Compiled and Drawn by

Alex. J. Grant, A.M., Can. Soc. C.E.







LAKE ST. FRANCIS
River
St. Elie

NAPIERVILLE

CHATEAUGAY

CHAMPLAIN

CLINTON

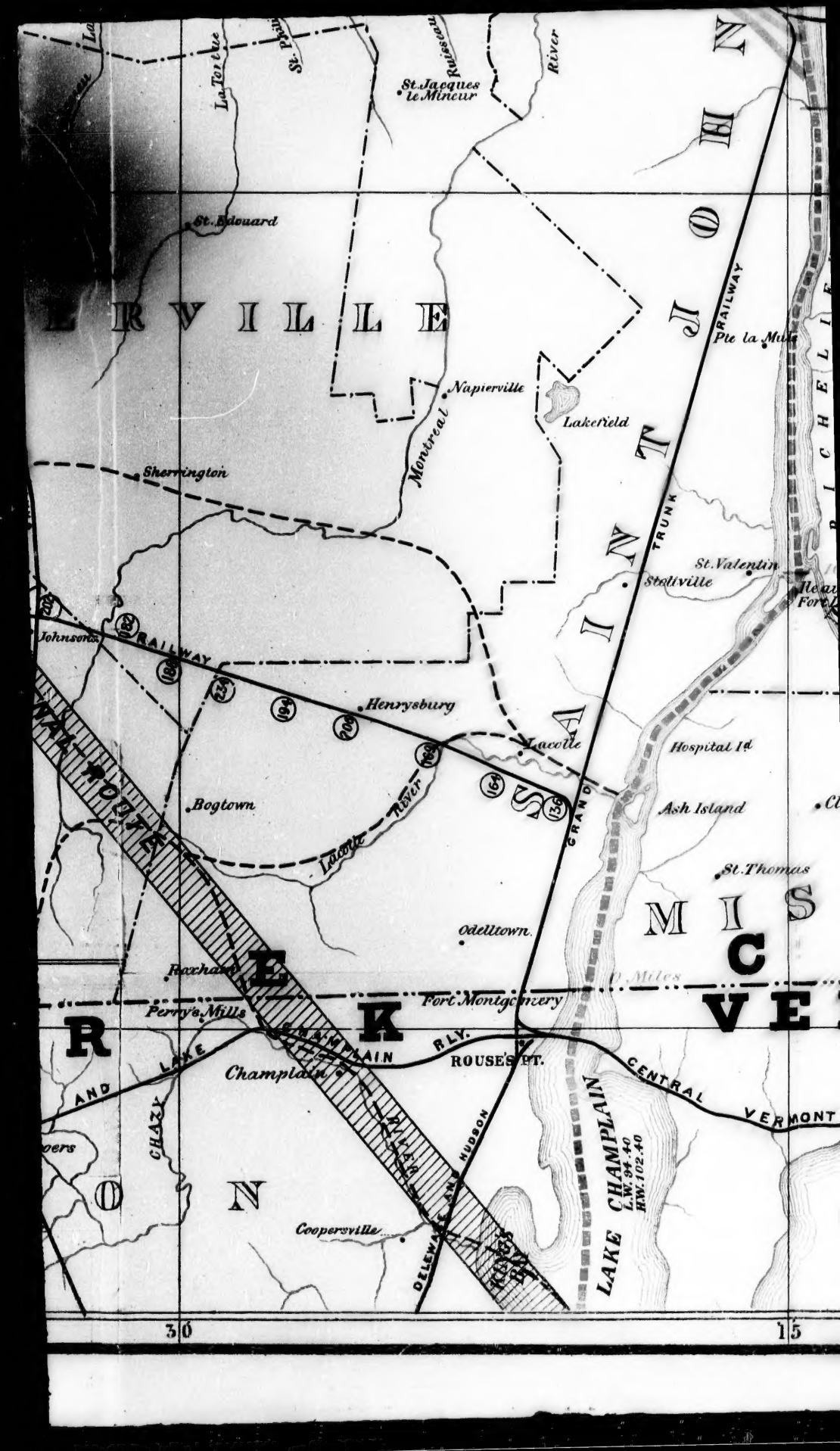
ROXBURY

CLINTON

Greenwich

45

30



St. Jacques
le Mineur

St. Edouard

ERVILLE

Napierville

Lakefield

Sherrington

Montreal

RAILWAY
TRUNK

Pie la Mu

St. Valentin

Stollville

Fort

Johnston

RAILWAY

Henrysburg

Macotte

Hospital Id

Bogtown

Lacotte

Ash Island

St. Thomas

M I S

C

V E

Odeltown

P. Miles

Fort Montgomery

R

E

K

RLY.

ROUSE'S PT.

Champlain

CENTRAL

VERMONT

Perry's Mills

CHAZY

Coopersville

DELEWAL AND HUDSON

LAKE CHAMPLAIN

L.W. 94.40
R.W. 102.40

